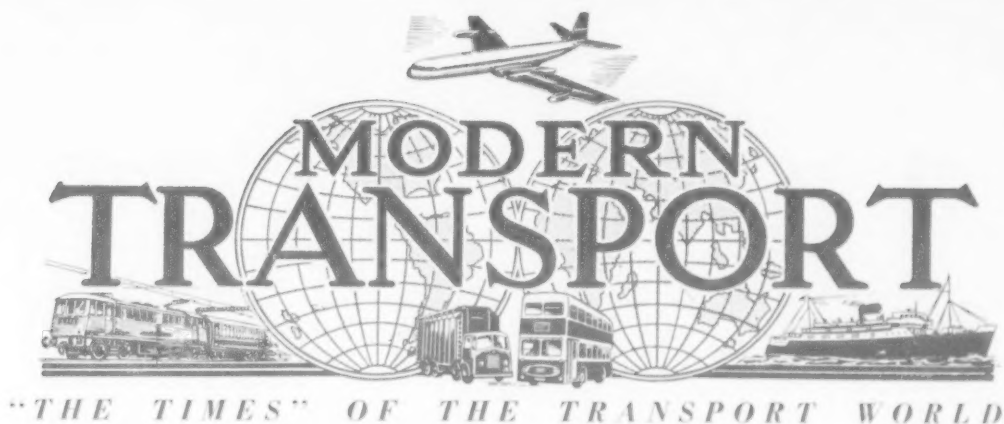


## BRITISH RAILWAY ELECTRIFICATION CONFERENCE



VOL. LXXXIV No. 2159

[Registered at the G.P.O.  
as a newspaper]

LONDON, OCTOBER 1, 1960

PRICE ONE SHILLING

# Co-operating in British Railways A.C. Electrification Programme



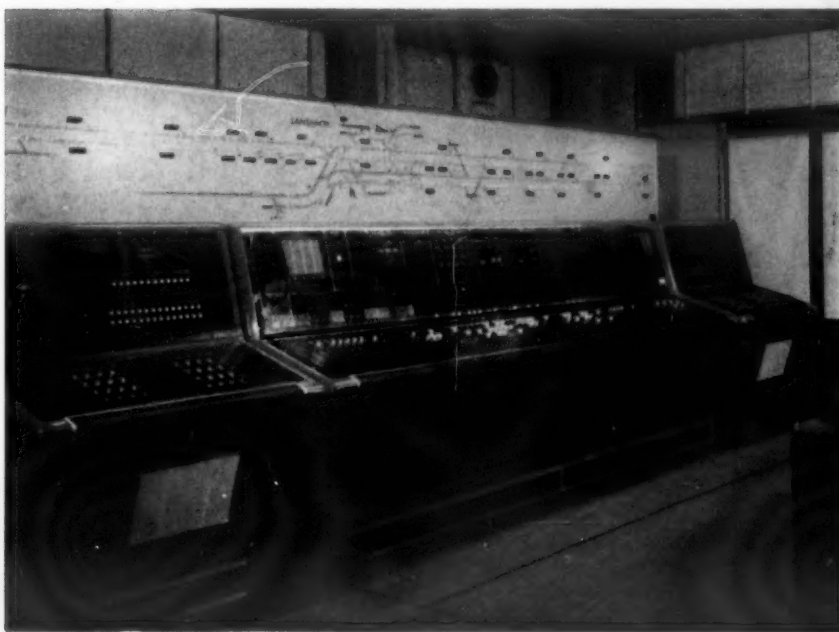
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play an important part  
in the British Railways  
modernisation plan

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WESTINGHOUSE SIGNALLING designed for the A.C. Electrification plan is being extensively adopted. The picture shows the O.C.S. Control Panel in service at Sandbach, on the Sandbach-Wilmslow Control area of the Manchester-Crewe Main Line, one of the many sections now operating or under construction



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Agents:—Bellamy & Lambie, Johannesburg



## ELECTRIFICATION

The artist's impression shows one of the electric locomotives for operation on the Manchester-Crewe section of British Railways.

This locomotive, built by Associated Electrical Industries Limited, is equipped with Timken axleboxes and, like all the other A.E.I. electric locomotives, has quill drives with Timken bearings.

Timken motor suspension units are used on all the motor coaches of the Manchester-Crewe multiple-unit stock, which was built by the Wolverton works of British Railways, and on the motor coaches of twenty further trains in hand for the Liverpool-Crewe service.

Timken axleboxes are used on all the Liverpool-Crewe multiple-unit electric stock.

British Timken, Duston, Northampton, Division of The Timken Roller Bearing Company. Timken bearings manufactured in England, Australia, Brazil, Canada, France and U.S.A.

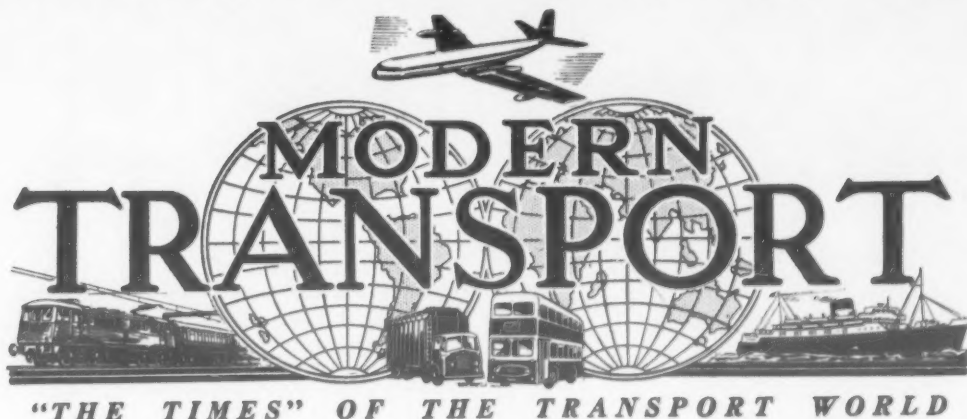
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REGISTERED TRADE-MARK  
**tapered roller bearings**





A C C S

See Page 27

MORE  
ABOUT  
EARLS  
COURT

See Pages 5 and 9

VOL. LXXXIV No. 2159

[Registered at the G.P.O.  
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LONDON, OCTOBER 1, 1960

PRICE ONE SHILLING

## A Showplace for Equipment

BRITISH Railways modernisation is providing manufacturers with the opportunity to show overseas buyers what British-made diesel-electric and electric locomotives can do under service conditions, said Mr. H. J. H. Nethersole, general manager, traction, English Electric Co., Limited, when two of his company's 2,000-h.p. Type 4 diesel-electric locomotives were named after famous ships at Riverside Station, Liverpool, on September 20. The locomotives D211 and D212, both of which have already travelled about 100,000 miles on the London Midland Region between Euston, Crewe, Manchester and Liverpool, were named respectively *Mauretania* and *Aureol* after ships owned by shipping companies associated with the port of Liverpool. This follows the earlier naming of D210 *Empress of England* at Euston. Mr. Nethersole said that throughout the world in under-developed countries railways must be improved and modernised. Competition for the supply of equipment was keen, but the British Railways system now provided manufacturers with a showplace for British equipment. His company was delivering 200 locomotives of this type to British Railways and the 100th would be handed over in the next month. He paid tribute to the co-operation received from the London Midland Region in developing and improving locomotives. Mr. Nethersole added that as the works of George and Robert Stephenson and other pioneers of the railway were now operated by English Electric, they could probably claim to be the oldest locomotive manufacturers in the world. The naming ceremonies were performed by Sir John Brocklebank, chairman of Cunard, and Mr. Malcolm Glasier, director of Elder Dempster. This naming ceremony comes opportunely before the B.R. electrification conference which will enable electric traction equipment manufacturers in particular to display their wares.

## S.N.C.F. Achievement

ELSEWHERE in this issue we deal with the progress of railway electrification in France, where for the first time more than 50 per cent of the traffic is now electrically hauled. That this has been achieved by electrifying only one-sixth of the system serves to emphasise the extent to which the work has been concentrated on the main traffic arteries. The obvious advantages of electrification such as heavier trains, faster services and lower operating costs are perhaps more widely appreciated than its indirect benefits. In France, for instance, the displacement of diesel traction has enabled redundant diesel units to replace steam, and on a much broader scale the displacement of steam by electric traction has enabled only the more efficient steam engines to be retained, with the result that the average daily mileage of a steam engine is now nearly 60 per cent higher than it was in 1938. Electrification cannot, of course, be given all the credit for the present high standard of operating efficiency in France, but it is certainly the key factor. In terms of passenger-miles and ton-miles the S.N.C.F. handled in 1959 44.8 per cent more passenger traffic and 102 per cent more freight traffic than it did in 1938. Yet the number of prime movers had been reduced from 19,400 to 9,350, the stock of coaching vehicles halved and goods wagon numbers reduced from 508,000 to 370,000. In the same period (1938-59) the personnel was reduced from 514,000 to 357,000. Compared with British Railways the S.N.C.F. operated 11 per cent less passenger traffic and 46.6 per cent more freight traffic in 1959. Yet it employed roughly 150,000 fewer staff, used less than half as many prime movers, less than half as many coaching vehicles and only slightly more than one-third as many freight wagons. The total number of train-miles was only 222,474 million compared with 371,000 million on British Railways and the total consumption of energy for traction in equivalent terms of coal was only 6.03 million tons,

whereas British Railways used 9.6 million tons of coal for steam traction alone! These figures clearly indicate what rationalisation and modernisation can achieve and are the more remarkable in that they represent only an interim stage in the search for yet higher standards of productivity.

## One Hundred Miles an Hour on Rails

TWENTY-FIVE years ago, on September 30, 1935, Britain's first streamline train, the London and North Eastern Railway's *Silver Jubilee*, entered regular service. It was the reply of the L.N.E.R.

over the 195½ miles from Paris to Dijon, or the 76.3 m.p.h. of the nonstop *Sud Express* over the 360 miles from Paris to Bordeaux, are readily capable of punctual observance with electric power. The 1955 modernisation and re-equipment plan of the British Transport Commission confidently promised 100 m.p.h. speeds in Great Britain in the future, but the portents now seem less favourable than they were. The Western Region, which a short while ago permitted unrestricted speeds over its principal main lines, since then has imposed a limit of 90 and on its diesel locomotives, which have shown their ability to reach 100 m.p.h., a further limit of

## CURRENT TOPICS

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chief mechanical engineer, H. N. Gresley, to the challenge of the German streamlined diesel-electric *Flying Hamburger*, whose daily 77-m.p.h. schedule between Berlin and Hamburg for the first time in railway history was demanding speeds in normal running up to 100 m.p.h. Three years earlier the Great Western Railway had shown with the *Cheltenham Flyer* that an average of over 70 m.p.h. could be maintained day after day between Swindon and Paddington, and that on a special run this figure could be pushed up to 81.8 m.p.h. from start to stop over this almost perfectly level course. The *Silver Jubilee* proved that the 70-m.p.h. average could be maintained consistently for a distance of well over 200 miles and over a hilly main line with several severe speed restrictions. Filled to capacity on almost every trip, even after an additional coach had been built into the formation, the *Silver Jubilee* also showed that the British public was prepared to pay extra fares for an exceptional standard of speed. The trial trip of this express, on September 27, 1935, was a startling demonstration of what might now be expected of steam power, with its average of 100 m.p.h. maintained for 43 consecutive miles and its twice-repeated maximum of 112½ m.p.h.; and since then three figures in speed on rails have no longer been a nine days' wonder.

## Later Records

BUT with other prime movers such maxima have been put in the shade; in Germany a diesel-electric train has attained 133½ m.p.h. and in their now historic tests made between 1953 and 1955, the French National Railways have worked test trains up to no less than 206 m.p.h. with two different types of electric locomotive. Today, although no speed higher than 100 m.p.h. is permitted in normal service, French train services prove that with electric traction such schedules as the 81.9 m.p.h. of the *Mistral*

80. One of the new 3,300-h.p. L.M.R. electric locomotives has touched 102½ m.p.h.; but no times shorter than 3 hr. now are foreshadowed for the through journey from Liverpool or Manchester to Euston when electrification is complete, even though such times would be easily possible with maximum speeds little if at all exceeding 80 m.p.h. As to the Eastern Region, since the war maxima of from 100 to 112½ m.p.h. have been recorded with Gresley Pacifics on a number of occasions and the prototype *Deltic* has maintained an average of 87½ m.p.h. with a 10-coach train up the whole of the long climb to Stoke Summit, as well as attaining 105 m.p.h. in the opposite direction. With such motive power capacity for fast travel, it is to be hoped that British Railways, when its modernisation is sufficiently advanced, will not be content to lag behind France, Italy and Germany, not to mention the United States, in this important matter. Air competition should certainly provide the necessary spur to acceleration.

## Why No Incentive to Exporters?

SOME Government encouragement or incentive to export was sought by Mr. G. E. Liardet, chairman of Simms Motor Units, Limited, when he addressed the firm's annual dinner last week. The event was attended by many overseas guests from almost every country in Europe and from India, Rhodesia, Egypt, Syria, South Africa and Tunisia. "As a group," Mr. Liardet said, "we have always been very export conscious. A short time ago the Prime Minister told us that exports were fun: well, we are not quite sure about that. Very often to us exports are just hard work requiring tremendous effort, the keenest possible prices, relatively expensive sales and service facilities and a host of other worries and troubles, and other than the thanks of a grateful nation we sometimes wonder what

we get out of it compared with the relatively easy sales on the protected home market. Surely," he continued, "the people who go out to export, and to earn the foreign currency which the country must have, are entitled to some encouragement or some incentive. Why cannot we have some relief of income tax in ratio to our direct export sales? It may be said that this is subsidising exports, but surely other countries do so and they encourage their exporters." Simms' own export business continued to climb and it was now running about 33½ per cent up on the previous year. The group exported to over 100 countries and had been particularly successful in the United States where a large volume of fuel injection equipment was exported "right into Detroit." A programme of factory extension was in hand. For Simms Motor Units it had been a year of massive progress. The Minipump range of fuel injection pumps for diesel engines was introduced and the first Minipump with mechanical governor was at Earls Court.

## Setting a Bad Example

THERE seems to be a certain amount of surprise in Government quarters at the hostile reception given by the airlines operating into and out of Britain to the proposed forms which British subjects would be required to complete. The airlines have, indeed, every justification. At a time when some 16 years' campaigning has reduced formalities at least to a limited extent, there comes this proposal that for the benefit of statistical records the airlines should issue these forms and collect them from passengers. It is no kind of argument at all that such forms are given to ships' passengers. The time factor involved is not comparable and, if it comes to the point, why should the sea travellers be badgered either? It is a matter of good fortune that the introduction of these proposals involves the laying of a statutory instrument before Parliament. When that happens there is an opportunity for members to challenge it and it is devoutly to be hoped that there are sufficient farseeing people in the Commons to make the responsible Minister sorry that he has to defend its deposition. The introduction of airport charges with all their complications could be laid largely at the door of a British Government and it will be deplorable if a successor instigates another move calculated to create unnecessary inconvenience to an ever-growing number of travellers.

## Rejuvenated Master Cutler

DISTINGUISHED passenger on the Eastern Region's all-Pullman express, the *Master Cutler*, on September 28 was, appropriately enough, the Master Cutler himself, Mr. P. J. C. Bovill. Travelling with him were several other leading citizens of Sheffield, including the deputy lord mayor, Alderman A. V. Wolstenholme, and the president of the Chamber of Commerce, Mr. R. S. Bruce. Accompanied by Mr. J. B. Peile, member, Eastern Area Board, and senior officials of British Railways and the Pullman Car Company, they made a special two-way journey between Sheffield and Kings Cross, marking the introduction of entirely new Pullman coaches on the train. When the *Master Cutler* was inaugurated on the Great Northern Line in September, 1958, it became the first diesel-hauled Pullman service in this country. A six-coach Pullman train has since run regularly—making two return journeys each day, Monday to Friday—between Sheffield and London. It covers the 161-mile single journey in approximately three hours. The new Pullman cars on the route between Sheffield and London form part of an order for 44 vehicles from Metropolitan-Cammell Carriage and Wagon Co., Limited, which will replace existing cars operating on the Eastern, North Eastern and Scottish regions. Good riding, exceptional absence of noise and traditional Pullman standards of service, comfort and good taste were well in evidence during a final trial run with the new stock; an illustrated description will appear in a subsequent issue.

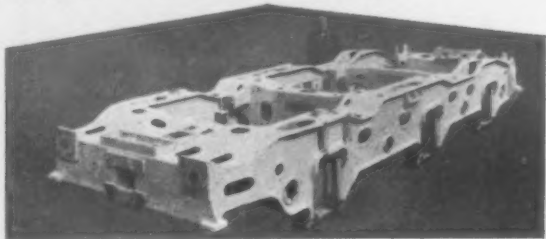


A.E.I. 3820 h.p.  
electric locomotive  
for New South Wales  
Government Railways  
built by Metropolitan-  
Vickers-Beyer,  
Peacock, Ltd.



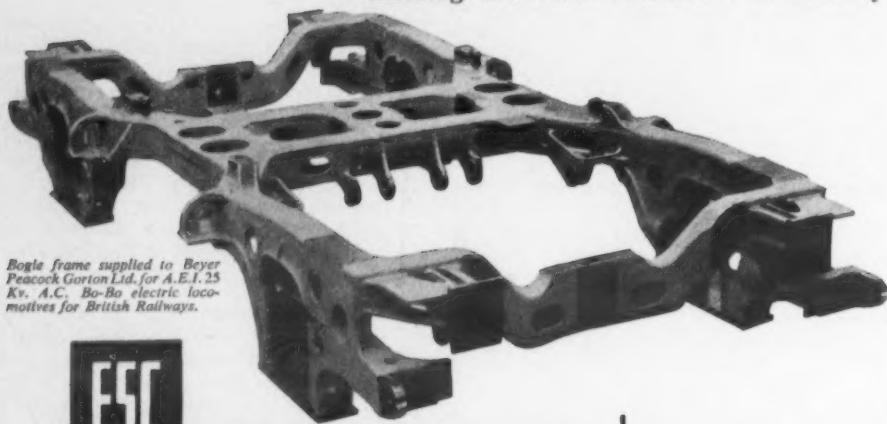
## A sound foundation for electric transport

6-wheel Driving Truck  
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## One piece cast steel BOGIES

The design combines maximum strength with minimum weight. ESC "Commonwealth" bogies give smooth easy riding at all speeds and require the minimum of maintenance, ensuring maximum locomotive availability.



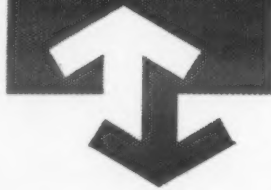
Bogie frame supplied to Beyer  
Peacock Gorton Ltd. for A.E.I. 25  
Kv. A.C. Bo-Bo electric loco-  
motives for British Railways.



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English Steel  
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## DESIGNING



## AND MAKING TRACTION EQUIPMENT

You, as an engineer, know that there can be no sharp dividing line between designing and building. A good design incorporates experience gained in making, testing and commissioning similar equipment in the past. And, of course, it is also shaped by the experience of all sorts of people using the earlier designs under a variety of conditions that could not be simulated in any test laboratory. To a long-established company such as Crompton Parkinson this process of feedback of information to the designer is fundamental. It is not always easy to put one's finger on the details on which it has had an effect. It shows up in the overall engineering rightness of a design—and of course in performance. In traction equipment, where space and weight must be kept down, and yet robustness and accessibility are at a premium, it shows up in the simplicity and elegance with which these conflicting demands are reconciled. As, for example, by the partial housing of the auxiliary generators within the main generators on the British Railways Type 4 diesel-electric locomotives. In the design of these generators we were able to make direct use of the experience we had gained with earlier generators for diesel-electric main line locomotives—as well as more indirectly from hundreds of other equipments for shunters, motor coaches and trolley buses.

**Crompton Parkinson**



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The Editor is prepared to consider contributions offered for publication in MODERN TRANSPORT, but intending contributors should first study the length and style of articles appearing in the paper and satisfy themselves that the topic with which they propose to deal is relevant to editorial requirements.

## Electric Traction in Britain

RAILWAYS in England were early in realising the benefits of electric traction. After the historic decision of the City and South London directors to electrify a railway originally designed for cable traction and its entry into service in 1890 there was a period in which the only applications were to the Liverpool Overhead and to the new underground lines. By the turn of the century the electrification of existing urban undergrounds—the Mersey, the Metropolitan and the Metropolitan District—was a live subject. In successive weeks of 1904 the Lancashire and Yorkshire Railway and the North Eastern Railway, both troubled by electric tramway competition, each introduced suburban electric services. The 600-volt direct current third rail system was used and this also found favour with the London and South Western Railway in a London suburban scheme carried out between 1911 and 1916. The London and North Western Railway, on the other hand, still more affected by considerations of through running with London Underground services, adopted the third and fourth rail system complete. By this time the Midland between Heysham and Lancaster in 1908 and the London, Brighton and South Coast on the South London line (1909) had essayed the 6,600-volt single phase alternating current system, with specially generated current at 16½ cycles, to take advantage of the reduced need for substation equipment, both with main-line schemes in mind, although tram and bus competition spurred the L.B.S.C. plans. Other experimentation comprised the L. and Y. Bury to Holcombe Brook 3,000-volt direct current line (1913) and the same company's Bury to Manchester electrification (1916) with a protected third rail fed at 1,200 volts.

## Progress

UPON the formation of the Southern Railway (which narrowly escaped having an ingenious 3,000-volt d.c. system on its South Eastern and Chatham suburban lines) the decision was made to standardise on the 600-volt d.c. system; although suburban operations only were then in view the advent of the automatic substation brought certain types of main line into the economic scope of low-tension electric operation, resulting in the Brighton and Portsmouth schemes and the postwar one of extending electric traction to Margate and Dover. The 1,500-volt d.c. system was first seen in Britain in 1915 on the Shildon—Newport mineral line of the North Eastern Railway and it was a thousand pities that Sir Vincent Raven's proposals for handling main-line traffic between Newcastle and York, for which an experimental express locomotive was built (with the perhaps unfortunate stock number 13), were not implemented. None the less, the 1,500-volt system, with its reduced number of substations and the minimum of electrical problems, was adopted as the British standard and used on the Manchester, South Junction and Altrincham scheme of 1931

and for the Manchester—Sheffield project first set out in 1936. The story of the development of single-phase traction at the industrial frequency of 50 cycles is well known. Introduced on a large scale by the French for the North East France schemes, its merits were such as to deserve close investigation here. With a contact wire tension of 25,000 volts the capital cost of electrical distribution to the track is so greatly reduced as to justify the addition of substation equipment on each motive unit in order to achieve the benefits of direct current traction motors. The adaptation of the system to British conditions has been a worthwhile exercise in which the British Transport Commission, the regions of British Railways and the British electrical manufacturing and railway signalling industries have all co-operated.

## Conference and Exhibition

NEXT Monday the British Railways Electrification Conference opens in London; corollary to it and the discussion of over 40 papers are an exhibition at Battersea Wharf in which some two score of British firms in the railway rolling stock, electric traction and signalling industries are participating and a series of visits for overseas delegates to electrification projects and to manufacturers' works. The event will demonstrate to the world a notable success on the part of British industry in providing for the use of 50-cycle current at high voltages under railway conditions much more onerous in respect of traffic density and physical obstacles than in the countries of origin across the Channel. In five years of research we have adapted the system to serve a densely built-up industrial country and have pursued some original lines of progress, such as germanium and silicon rectifiers for traction purposes, with success. Our first 50-cycle a.c. electrification, at 6,600 volts, was a revivification in 1953 of the Midland Lancaster to Morecambe and Heysham line. First to open of the extensive schemes proposed by the Commission was the Colchester—Clacton 25,000-volt line, first instalment of a Great Eastern Line scheme for the Eastern Region. There has just been opened the Manchester—Crewe section of the Manchester and Liverpool to London scheme of the London Midland Region; coming are the Helensburgh—Glasgow—Airdrie lines of the Scottish Region and the North East London suburban project of the Great Eastern Line. Also in the B.T.C. plan was the East Coast route from Kings Cross to Yorkshire and the Great Northern Line suburban area, but the 1959 reappraisal deferred the first of these projects.

## A Good Prospect

WE believe that electric traction can do more to set British Railways on its feet economically than almost any other single factor. Unless all European railway administrations and their sponsoring governments are entirely deluded, the economic virtues of main-line electric traction at the level of traffic density encountered all the year round on our principal routes offer irrefutable justification of the heavy capital expenditure involved. Some figures relative to the rejuvenation of French railways appear elsewhere in this issue; more train-mileage can be operated but there are considerable savings on numbers and cost of motive units with reductions in staff and fuel costs of as much as 40 per cent and quite startling savings in motive power depot expenses. It would not be unfair to expect electric traction to cost 30 per cent less a train-mile and for schemes concerning heavily-used lines to repay their costs in less than a decade. Moreover, the attraction of the service, with cleanliness, frequency and speed as its assets, should maximise traffic and regain lost ground for the railways both in the passenger and freight departments. Rather than curtail our electric traction projects we should be considering how to implement extension of the West Coast route scheme over the difficult road to Glasgow and how to effect early introduction of the Great Northern Line project to the West Riding and its extension northward at least to Newcastle upon Tyne and possibly to Edinburgh. There might well be grounds in the national interest for examining such routes as London to Bournemouth and London to South Wales; there should be no hesitation in backing a good prospect.

## NEWS SUMMARY

THE first four of 44 Pullman cars now under construction by the Metropolitan-Cammell Carriage and Wagon Co., Limited, for locomotive-hauled Pullman trains of the Eastern and North Eastern Regions have been placed in the make-up of the Master Cutler.

The Travelator at the Bank Station of the Waterloo and City Line of the Southern Region was formally inaugurated by the Lord Mayor of London on September 27.

Discussions are taking place between the English Electric Co., Limited, and the General

Electric Co., Limited, regarding a merger of the two concerns. This was announced on September 27, when it was added that activities of each were in many respects complementary, but it is not expected that there will be any further statement for some time, possibly a matter of months.

When the Minister of Transport opened the Commercial Motor Show he expressed his determination to maintain the scheme for the testing of vehicles at approved stations (page 9).

Some details have been announced of the train services on the London, Tilbury and Southend Line of the Eastern Region when it is electrified next year (page 25).



# B.R. ELECTRIFICATION CONFERENCE

Next Week's Event in London

EXHIBITION AT BATTERSEA WHARF



ON Monday, October 3, the British Railways Electrification Conference will be opened at 10.15 a.m. by Sir Brian Robertson, chairman of the British Transport Commission, at the Institution of Civil Engineers. Delegates include over 200 railway engineers from all over the world, to whom are being made available over 40 papers on various aspects of the B.R. system of high-tension alternating current electrification using 50-cycle current from the grid. During the week delegates will have an opportunity of discussing certain of the papers and of visiting electrification projects on the London Midland and Eastern Region railways. Articles in this issue indicate the scope of what is being carried out in those regions and in Scotland, as well as abroad.

In addition there will be an exhibition of electric locomotives, rolling stock and electrification equipment at Battersea Wharf, London; this will be opened by the Minister of Transport, Mr. Ernest Marples, at 3.15 p.m. on October 3. We indicate below some of the highlights of the Battersea display, which includes 15 locomotives, coaches and bogies and the stands of 29 manufacturers. Delegates who desire to visit the factories of British equipment manufacturers have the choice of 97 firms and works in which to see production in progress. The conference and exhibition arrangements reflect great credit on the British Transport Commission, the Locomotive and

of the rectifier transformer and for the field weakening of the traction motors. A Westinghouse silicon rectifier is shown and a 230-h.p. traction motor on stand 31. There is a crystal chronometer and a cordless switchboard on the stand (No. 39) of Communication Systems, Limited.

## Dismantled Motor

To facilitate inspection Crompton Parkinson, Limited, will show a C152 motor in dismantled form. It is suitable for operation on rectified single-phase a.c. supply at industrial frequency. Commutation is satisfactory at up to 30 per cent ripple. Insulation to earth is designed for a working voltage of 1,500 d.c., so that it can be used for dual operation between 50-cycle and 1,500-volt d.c. systems. A range of 15 insulator assemblies will be displayed on the Doulton stand (No. 23), comprising units of 8,000, 15,000 and 30,000 lb. in. electro-mechanical rating, for both 25-kV and 6.25-kV, all units being of the fully vitrified high-grade siliceous porcelain type.

Enfield-Standard Power Cables, Limited (stand 17) shows cable samples of all types required for railway electrification, terminal equipment, line-side cabinets, railbonds, moulded rubber plugs, sockets, glands and terminations for such items as coach interconnector tables. There is also shown the Untye wiring system for temporary lighting during tunnel maintenance, bridge building and similar work.

## Long Experience

With long experience and our first 50-cycle trains to its credit the English Electric group (stand 34) figures in a number of outdoor



How the S.N.C.F. commemorates its electrifications—medal for the opening of the Strasbourg-Basel line in 1957

Allied Manufacturers Association of Great Britain, the Railway Carriage and Wagon Building Association and the British Electrical and Allied Manufacturers Association.

## Power and Light

Incidentally, power for the exhibition is being provided by a Paxman 8RPH alternator set lent by Davey, Paxman and Co., Limited, of Colchester, and a 50-ft. floodlighting tower with A.E.I. floodlights has been provided by British Insulated Callender's Construction Co., Limited; it was fabricated and galvanised by Painter Brothers, Limited, Hereford. Similar 150-ft. towers have been erected in Crewe yards.

## Round the Stands

The Traction Division of Associated Electrical Industries will occupy stand No. 38, while outdoors B.R. will show A.E.I. a.c. locomotives for the London Midland Region and A.E.I. a.c. multiple-unit stock for Glasgow. The equipment on the A.E.I. stand will include both single-anode and multi-anode mercury-arc rectifiers as well as silicon and germanium rectifiers, a main transformer, an air-blast circuit-breaker, and a locomotive traction motor complete with a wheel and axle assembly incorporating the Alstom flexible drive. Control gear and tap-changing equipment will also be included, as well as a controller, reverser, overload relay, contactor, potential transformer, relays and an automatic power control panel. Also on the A.E.I. stand will be railway-signalling exhibits of Associated Electrical Industries-G.R.S. Company, and a working display by A.E.I. Instrumentation Division showing single-phase distance impedance protective gear for overhead lines. On stand 28, Associated Electrical Industries (Woolwich), Limited, will show a new type of feeder cable—a 25-kV concentric oil-filled type, with illustrations of typical cable-laying operations.

In a rather different but essential field is the precast concrete cable troughing and fittings supplied by H. J. Baldwin and Co., Limited, and shown on stand 11 with clay cable protection covers. The products of the B.I.C.C. group appear on stand 15 where overhead equipment and fittings will be shown alongside specially screened aluminium sheathed telephone cables, power cables and signalling cables.

## Copper

High-conductivity copper for commutators, control gear and other equipment is the responsibility of Thomas Bolton and Sons, Limited (stand 12), a firm which was manufacturing copper even before the days of the steam railway and later made a worldwide reputation for copper for locomotive fireboxes. On stand 32 there will be a display of the products of Bruce Peebles and Co., Limited, which has supplied large numbers of transformers for the Eastern and Scottish Region electrifications as well as equipment for the Deeside battery-electric railcar service.

The Traction Division of Brush Electrical Engineering Company, which dates from the earliest days of electric railway and tramway operation in Britain, shows a 1,010-kVA 25 to 6.25 kV oil-cooled rectifier transformer for mounting below the frame of a motor coach; the high-voltage changeover switch is tank-mounted. There is an air break on-load tap changer for voltage control

exhibits. There is also shown a silicon rectifier for a multiple-unit set and an ignitron type mercury arc equipment, two of which supply a 3,300-h.p. locomotive. The Expanded Metal Company (Electrical Division) shows on stand 25 resistors, rheostats and allied equipment. Fuller Electric (stand 30) supplied 33-kV switchgear to the Southern Railway from 1930 onwards and is now able to supply complete power supply installations for a.c. or d.c. electrification. The company is the English representative of A.S.E.A. of Sweden.

Exhibits on stand No. 14 will be the Ferranti railway line clip-on ammeter and high-voltage indicator for railway overhead lines. The ammeter is believed to be the first of its type specifically developed for railway applications. It is basically similar to the conventional Ferranti clip-on ammeter operating on the split-core current transformer principle, except for the triangular-shaped core which embraces all standard types of railway lines and facilitates measurements being taken quickly and efficiently by linemen. Six separate ranges are obtainable on the instrument which are controlled by a thumb-operated selector switch. The high-voltage indicator, which was developed by Ferranti, Limited, at the request of British Railways, enables voltage measurements on 25-kV overhead lines to be carried out in safety. Of the electrostatic type, it can distinguish between d.c. static, ordinary a.c. and induced voltages.

## Wide Range

On stand 20 Foster Transformers, Limited, shows a signalling transformer for auxiliary stand-by work, booster transformers, current and voltage transformers and high voltage test equipment. A wide range of General Electric exhibits (stand 36) includes traction motors, Com-Pak rectifier equipments, transformers with automatic changeover switches and motor-driven tap-changing switches, master controllers and a motor-generator blower set. The Com-Pak has a particularly high power-weight ratio and can withstand heavy overloads. Signalling equipment by Siemens and General Electric Railway Signal Co., Limited, is also prominent on this stand.

The Microcell electronic supervisor is displayed on stand 26. Visitors to the Morgan Crucible Co., Limited stand (13) at Battersea Wharf will see a wide range of group products. Morgan Crucible Carbon Department will show a range of carbon brushes for modern traction machines; pantograph carbons, resistance rings for voltage control on train lighting systems; metal-carbon contacts for control gear; and silver-graphite contacts for signal relays. Of particular interest is the fact that British Railways has adopted Morgan Crucible's metal-carbon grade LINK MY7D for use on collecting strips in Stone-Faiveley pantographs. This grade has been supplied for many years to the Netherlands Railways. A new and interesting development by the company is the use of sintered copper on steel commutator segments, permitting a much stronger and more stable commutator than has hitherto been possible for high-speed traction machines. Sintered bearings, as used in switch and other control gear components, will also be displayed. Morgan Components, Limited, will show Morganite brush holders for traction equipment, as well as metal contacts for control gear; while the Graphite Products, Limited, contribution will be switch plate and overhead conductor lubricants.

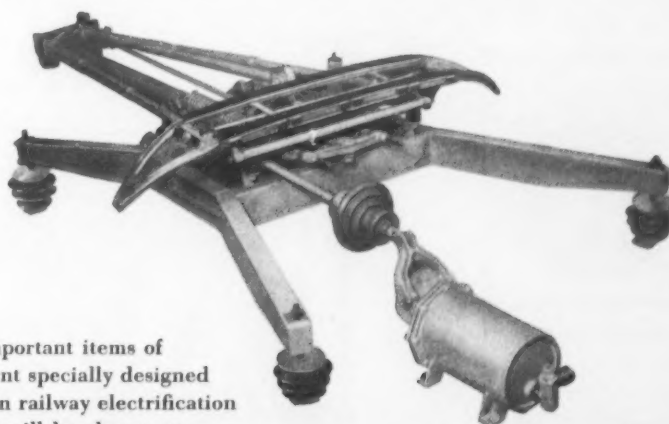
(Continued on page 15)

OUT  
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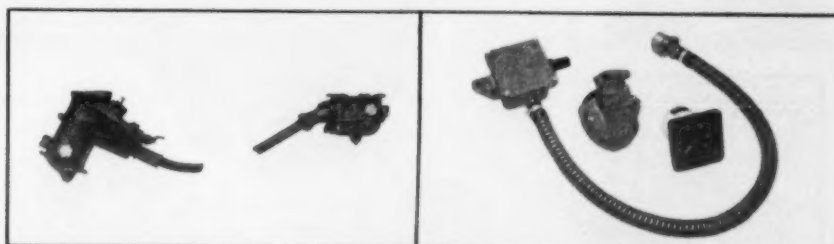
THE SKF BALL BEARING CO. LTD. LUTON - BEDS.

## progress through electrification



The Stone-Faiveley pantograph, adopted by British Railways

Some important items of equipment specially designed for use in railway electrification schemes will be shown on our Stand, No. 16, at the British Railways Electrification Exhibition. They will include Stone-Faiveley pantographs and intercoach couplers, Smith-Stone speed indicating and controlling equipment, and the Stone Carriage Temperature Controller. We are looking forward very much to discussing these important products with the delegates and other visitors



Stone-Faiveley intercoach couplers

Smith-Stone speedometer equipment

J. STONE

& CO (DEPTFORD) LTD

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## LORRY—BUS—COACH

## Fuel Tax Relief: Socialist View

PRIMARILY to safeguard the long-term interests of the coal industry, and to ensure that adjustments in the use of various fuels are made more gradually, the Labour Party and the T.U.C. have jointly adopted an interim fuel policy, to be submitted at the Scarborough conference, for a 1½d. per gal. tax on fuel oil used in industry. The tax on fuel oil was removed by the Socialist Government in 1947. An important corollary, however, is that the resultant revenue should be applied in reduction of the rate of tax on diesel road vehicle oil, "which can be justified most strongly in relation to passenger transport."

## T. and G.W.U. and London Bus Crisis

IN the light of the second rejection by London busmen of a bonus scheme aimed basically at attracting new recruits to London Transport, Mr.

the T.R.T.A. The effect of a ban is to introduce a further complication into the classification of dual-purpose vehicles.

## Licensing in Tanganyika

IN two years the number of private goods carriers licences has nearly doubled, rising from 2,439 in 1957 to 4,272 in 1959, says the annual report of the Tanganyika Transport Licensing Authority. It is concerned at the amount of carrying for hire or reward that goes on in private vehicles and is recommending that restrictions as to area served should where necessary be placed on such licences. The Authority says that some public carriers also acquire private carrier's licences to mask illegal operations. The licensing system in Tanganyika, both for passenger and goods vehicles, is basically similar to that in Britain. On the passenger side

and it appears to him to have been incumbent on the appellants, in the circumstances of this case, to show cause why more circuitous routes should be permitted.

The essential point for decision on the appeal was whether the scheme proposed by the Commissioners offered such advantages in the reduction of congestion in the central streets of Colchester over the alternatives put forward by the appellants as to offset the loss of traffic to certain services of the appellants and the possible inconvenience to travellers from districts outside the range of municipal services that might follow its introduction. The Minister agreed with his inspector that although the appellants were likely under the scheme proposed by the Commissioners to lose some revenue hitherto obtained from carriage of passengers within the borough such losses were unlikely to be serious and should not be sufficient to jeopardise the maintenance of their rural services. The appellants failed to establish that any inconvenience caused to country passengers would be such as to warrant departure from the Commissioner's proposals.

## Higher Fares in Granite City

PREPARATIONS are being made in Aberdeen for selective increases in municipal bus fares, at present among the lowest anywhere. The 2d. fare for two stages would be retained but certain 3d., 4d. and 4½d. fares would be raised by one penny or a halfpenny. The last wage award will cost Aberdeen £95,000 per annum. The higher fares would increase revenue by about £83,000; last year the undertaking finished with a surplus of £45,000.

## More "Gay Hostess" Coaches

SINCE making their debut on express services operated by Ribble Motor Services, Limited, and its subsidiary, W. C. Standerwick, Limited, the 50-seat Leyland Atlantean "Gay Hostess" double-deck coaches, on which light refreshments are served, have proved so popular that it has been decided to order 12 more for delivery in time for summer operation in 1961. Ribble now operates 15 of these coaches and the latest order will increase the Standerwick fleet from 10 to 22.

## Packham Group Switch

A SUBSIDIARY of A. Packham and Co., Limited, Griffin Brothers (Highbury), Limited, has ceased to operate as a London parcels service and now specialises only in contract hire work. All parcels work hitherto operated by Griffin Brothers will henceforth be operated by the parent company. Griffin Brothers has been providing vehicles on contract hire for some time to a number of widely known concerns. From now on it will specialise in and develop this field. A. Packham recently applied for A- and B-licences for some 15 Griffin vehicles, which it will operate under its own name on parcels and smalls work.

## Agenda for R.H.A. Conference

INSTEAD of prepared papers and the transport forum which have been features of recent R.H.A. conferences, the Blackpool conference, on October 10-12, will have a discussion on the future of road haulage, which will be initiated by North Western area representatives. This will be in addition to the usual programme of resolutions. Principal guest at the conference banquet is ex-

pected to be Sir Richard Nugent, former Joint Parliamentary Secretary, Ministry of Transport.

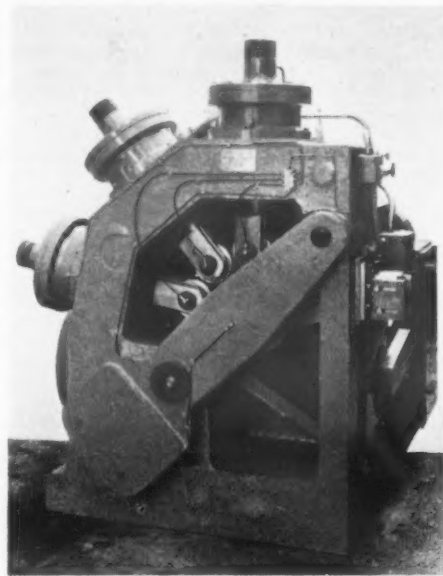
## Bus and Coach Developments

Portsmouth Corporation proposes to absorb its Hilsa (Lido)—Paulsgrove service (21) in its South Parade Pier—Fratton Bridge—Cosham route (3 and 4) which would continue to Paulsgrove. Sheffield United Tours, Limited, applies for excursions and tours from Sheffield previously operated by G. E. Whiteley.

## BRAKE-SHOE ROLLER

## New British Machine

HIGH production rates, great accuracy and simplicity of operation and maintenance are claimed for a new machine designed and built by Kings Heath Engineering Company, Birmingham, for the production by cold rolling of T-section steel brake shoes for heavy road vehicles. The project was undertaken by the company at the request of a motor manufacturer who was experiencing difficulty with existing machines



The KHE904 brake-shoe roller machine

of foreign origin, necessitating a second machining operation to correct rippling of the face of the rolled shoe.

Designated KHE904, the new machine is electrically driven and hydraulically operated; it incorporates needle roller bearings and pressure lubrication. It has a production rate of 1,000 shoes an hour manually fed, while automatic feeding mechanism now under development will increase the rate. It is a compact machine, measuring 6 ft. 8 in. by 5 ft. 2 in. by 6 ft. high. A delivery time of about four months is quoted, compared with some two years for foreign equivalents. A feature cited to indicate the superiority of the KHE machine is that formers can be changed in about 8 min. against 8 hr. for the foreign machine.



Albion Chieftain with Duramin bodywork operated by a Hertfordshire miller and corn merchant—a Macgness sack loader is fitted. The A.E.C. on the right has five-speed gearbox and Pirelli tyres—manufactured in its operator's home town, Burton-on-Trent

Frank Cousins, general secretary of the T. and G.W.U., has apparently swung to the view that a special inquiry into the London bus staffing crisis is perhaps justifiable. Hitherto the official union view has been that any inquiry should be of a wider character. The result of the ballot at the 104 garages on the bonus scheme was a two-to-one vote against it in terms of garages. In terms of individual votes the opposition was about ten-to-one.

## Discrimination in New Parking Ban

THE experimental ban on cars or dual-purpose vehicles loading or unloading in the Mayfair area of London, where on-the-spot fines are enforced, is being challenged by the Traders Road Transport Association insofar as dual-purpose vehicles are concerned. Ordinary commercial vehicles are not affected. The T.R.T.A. is concerned with those dual-purpose vehicles which are operated under a C-licence and which are subject to the same legal and other requirements as a commercial vehicle, including the observance of the law governing drivers' hours and the keeping of records. To discriminate against this class of vehicle when it is used under a C-licence is a little too sweeping, said

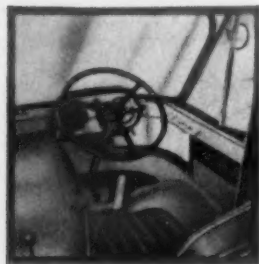
the chief problem is to satisfy the aspirations of Africans to acquire buses, since there are now few openings for new routes. The evolution of larger single-deckers which cost little more to buy or to run is also a problem, since it results in added competition between rival operators. Most buses are acquired on hire purchase and owners must have stable operating conditions.

## Disputed Routes to Bus Station

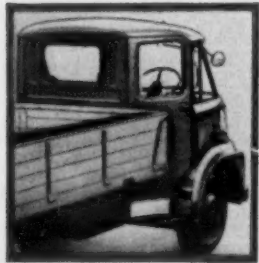
AT the instance of Colchester Corporation, the Eastern Area Traffic Commissioners proposed more direct routes to the forthcoming new bus station at Lewis Gardens, Queen Street, than the Eastern Counties and Eastern National companies would have liked. Now they have lost their appeal to the Minister of Transport on the issue. The companies argued that the Commissioners had wrongly placed upon them the onus of proving that their services should not follow routes to the new station proposed by the Commissioners. The Minister considers it reasonable, however, that the Commissioners should have proposed as the most suitable routes for the appellants' services to follow the most direct ways to and from the new station



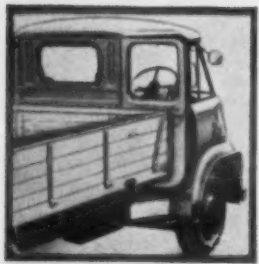
easier access



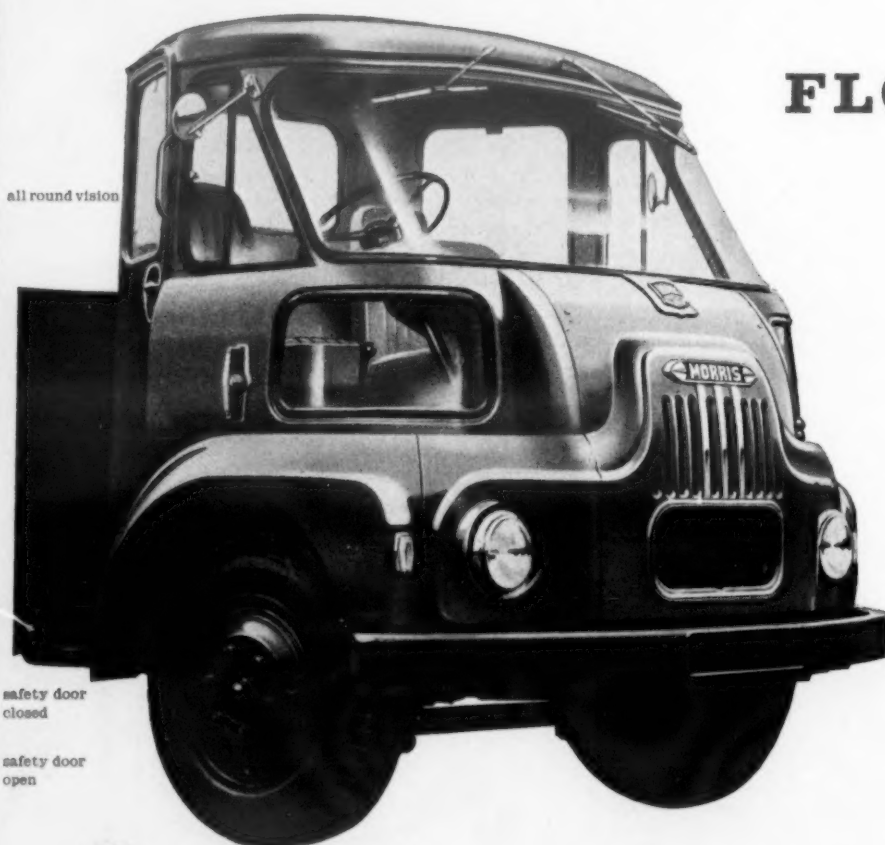
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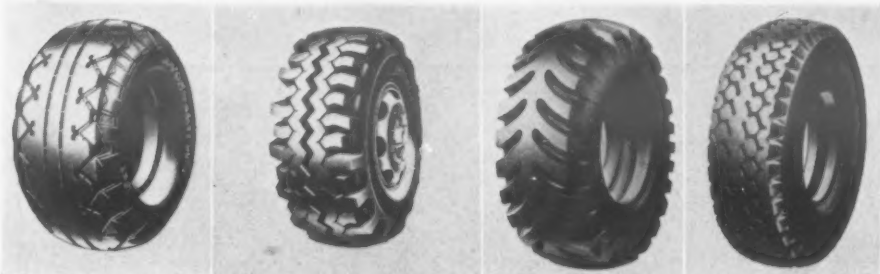
## EQUIPMENT AND ACCESSORIES

Many New Products Displayed

WIDE RANGE AT EARLS COURT

THE two years which have passed since the last Commercial Motor Show have seen considerable progress in the design of new accessories and equipment and also in the refinement of

work, the Damage-Dozer can cope with all types of chassis and bodies of unit construction. The S360 hydraulic press is also seen for the first time. Designed for maximum capacity in minimum floor

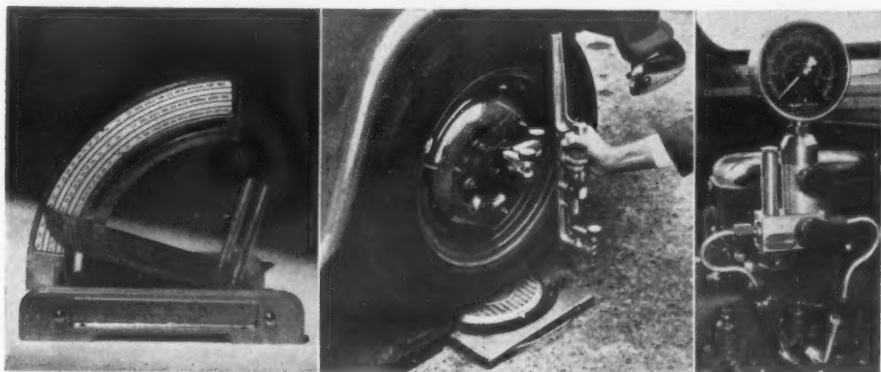


Typical tyres on show: Avon heavy-duty Low Loader, Firestone Super Mileage Lug, Henley cross-country and India Super G25

existing products to enhance both appearance and efficiency. Some of these which figure in the show—mainly on stands in the gallery—are set out below.

Main exhibit of Auster, Limited (stand 381), is a

space it has a table adjustable over a range of 28 in. and a standard hydraulic unit which can be quickly detached for use elsewhere. Bars-Leaks (England), Limited, (stand 291) demonstrates the preventive effectiveness of its preparation for water cooling



The Blundell, Spence Vultmeter paint-mixing device; the Dunlop camber, castor and king-pin gauge and, right, the Dunedin Injector Mark II attached to a B.M.C. 2.2-litre diesel engine

full-fronted barrel-shaped windscreen assembly, complete with side panels. Another windscreen assembly is of the lantern type and the now well-proven double deflecting ventilator unit suitable for either the front bulkhead or side windows is also being emphasised, as is the Rotavent permanent ventilating system, which may be fitted either as a

systems and also a new adjunct in the shape of a reverse flushing gun.

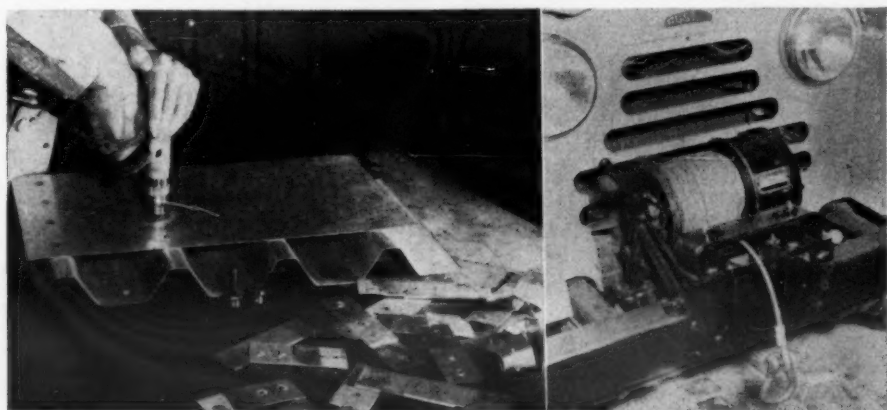
An innovation by Blundell, Spence and Co., Limited (stand 284) is the Vultmeter, a colour-mixing device which requires no dipstick. It is intended primarily for use with Vultro, but can also be used for one-coat Glossex. Bricovmo, Limited (271), shows its usual range of pistons, rings and the like and particularly those for the export trade in which it is now specialising. A new prototype lightweight oxy-acetylene hand-cutting blowpipe—the Firefly—is shown for the first time by British Oxygen Gases, Limited (stand 137). The Firefly is being shown because of its interest to garages and small workshops and will be marketed from January 1, 1961. Also on display is the latest Argonarc spot-welding torch. The new Firefly weighs only 12 oz., cuts up to 1/4-in. thick steel and is resistant to backfires. It is robust, compact and light and fitted with forward-mounted controls. Nozzle mixing and perfect flame control make it ideal for repair work and delicate cutting of light sheet metal. The new prototype Argonarc spot-welding torch—which will be marketed in 1961—is easy to use and cheap to run. Access to only one side of a joint is needed. Spot welds can be made with one hand and by semi-skilled labour and shear values compare favourably with those from resistance welding. Semi-automatic welding operations are preset. The torch is water cooled and can carry currents up to 250 amp.

A further development in the field of vehicle body construction which is produced by the British Aluminium Co., Limited, and its associates (stand 413), consists of a system of interlocking extruded aluminium sections which can be snapped together to form a strong and attractive body structure of any required size. The assembly is simple, and the alloy and section dimensions can be varied to meet the particular needs of the structure. The sections are placed side by side, with the interlocking joints making initial contact at a slight angle. When the principal flat surfaces are thrust into line, the leg of the integral stiffening channel snaps over a projection on the back of the adjacent section, first



Chapman Mark 166 adjustable coach seat

front ventilator or side window. A new range of low-loader tyres appears on the stand of the Avon India Rubber Co., Limited (187). These have continuous centre ribs and a flat contour to ensure long, even wear. Low-loader sizes 29 by 8 and 27 by 6 are also available in the Traction Mileage



A British Oxygen prototype Argonarc spot-welding torch which is shortly coming on the market is here welding aluminium; the Turner 2,500-lb. winch which is being exhibited for the first time

pattern. Other ranges include the Highroad, Highway Monarch and Express Delivery.

A full-size van body with a wide range of repair and realigning equipment figures on the stand of E. P. Barrus (Concessionaires), Limited, (139). This includes the Damage-Dozer which appears for the first time. A development of the Pull-Dozer, which was designed primarily for light body

engaging and finally locking the joint. Prior to assembly, the mating surfaces are usually coated with a suitable adhesive to seal the joint completely. The advantages claimed for this form of construction are that it provides a completely smooth and non-porous interior which is non-toxic and non-corrosive, together with an exterior of (Continued on page 16)

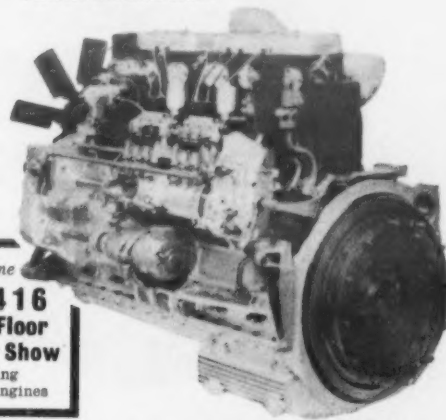
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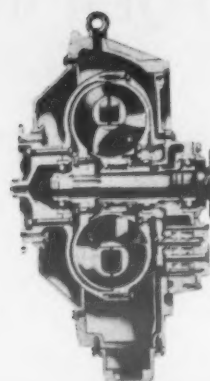


# TRANSMISSIONS FOR ROAD TRANSPORT

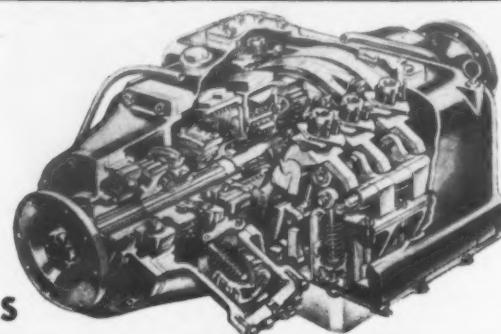


Our Automatic Gearbox  
in service with London Transport  
on the Green Line "Routemaster".

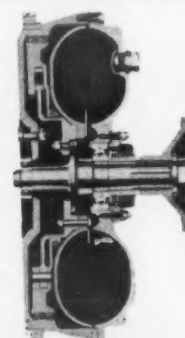
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GEARBOXES



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**Smethwick**

**& WAGON CO. LTD**

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TELEGRAMS  
'CARRIAGE SMETHWICK'



## ON THE SOUTHERN REGION

### Direct Current Third Rail Traction

#### MOTOR LUGGAGE VANS WITH BATTERY EQUIPMENT

FOR historical reasons the Southern Region of British Railways employs direct current at 660 volts in its electrified zone, transmitted to the trains by a third conductor rail, with running rail return. Under the modernisation plan this has been extended to the Kent Coast line serving Sheerness and the resorts of Margate and Ramsgate; it has already reached Dover via Faversham and Canterbury. Well in hand is the next phase in which the routes to Dover and Ramsgate via Ashford will be tackled and the Dover—Deal—Ramsgate route will be added. In the Battersea exhibition is one of the locomotives for this electrification, employed on boat trains such as the *Night Ferry*, and also available for miscellaneous traffic and for passenger trains from other regions.

These machines, with motor generator equipment which prevents them being gapped on breaks in conductor rail, have already been described in our columns; less well known are the battery-powered self-propelled luggage vans which are added to multiple-unit boat trains for conveyance of passengers' luggage on to the Admiralty Pier at Dover and (eventually) alongside the boats at Folkestone. They thus need neither the third rail, with its attendant dangers to passengers on the quays, nor overhead wires which would interfere with crane operations.

#### For Use with Multiple-Unit Sets

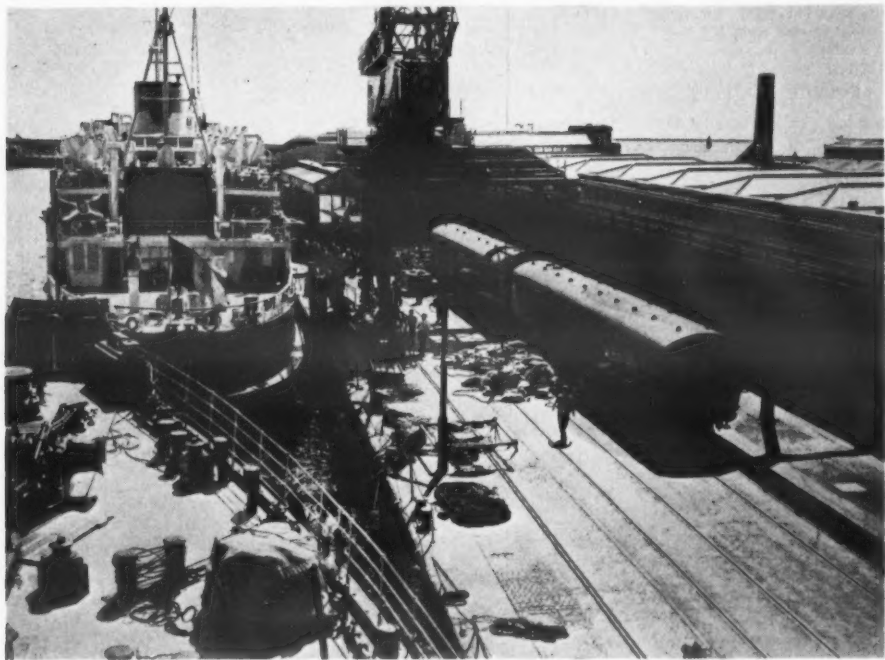
When, following electrification, it was decided that almost all boat trains should be made up of multiple-unit sets, a method of handling mail and registered baggage under Customs seal had to be devised. Ordinary vans attached to the multiple-unit trains were ruled out, even if fitted with

sidings which have no provision, such as a side ramp, for leading the shoes back on to the conductor rail. A state-of-charge meter is also fitted to give the driver adequate warning of battery exhaustion. The compressor and exhaust are supplied from the traction battery, or from its charging supply when on the line, but the control gear and lighting are supplied from a 70-volt source consisting of a generator driven by the same motor as the 200-volt generator and a battery of 42 amp-hr. capacity. Both batteries are of the lead-acid type, although all the control batteries on the multiple-unit sets are of the alkaline type.

#### Operation

The first working of these M.L.V. cars started on June 15, 1959, on the Victoria—Dover Marine—Ostend boat trains, two round trips per day being made on that service. In this they were successful and at the beginning of 1960, with a view to making further tests under operating conditions, the 8.6 p.m. Cannon Street to Cannon Street parcels train was operated with one of the vans. The train runs down via the Dartford loop line, calling at the principal stations and shunting as necessary; on arrival at Dartford a van of mail, which has already been loaded and is standing in the dock in readiness, is attached and the train returns to London via the Bexleyheath line, again calling at prearranged stations. Station staff and travelling inspectors reported enthusiastically. So far as the actual M.L.V. is concerned, this is loaded and unloaded en route and gives satisfaction.

The E.E.507 type motor, which develops a nominal 500 h.p. and is the same as that used on the Kent coast stock, stands up quite well to the



Two motor luggage vans operating on the quay at Dover Marine on their batteries in conjunction with the Belgian boat train

air brakes, for two reasons: they would reduce the power to weight ratio of the trains, which would make them unable to keep up with other trains on the line, and, in the London direction, the train could not be driven from them. Motored bogie luggage vans were therefore being built with driving cabs at each end, two for the first phase of the electrification which came into service in 1959 and eight more for the second phase, when all boat trains except the *Golden Arrow* and the *Night Ferry* will be made up of multiple-unit sets.

Each van is the same length as the coaches of the multiple units, 64 ft. 6 in. over body ends and, apart from the two driving cabs and a small guard's compartment at one end, the whole of the floor space is given over to the conveyance of baggage, with a partition dividing the baggage compartment into two unequal sections. Three pairs of wide double doors are provided on each side, which are wide enough to take pallet trucks. Strengthened floors have been provided to allow trucks to manoeuvre inside the vehicle. The general construction and the bogies are identical with those of the other electric coaches built for this scheme.

#### Electrical Equipment

The power and brake equipment, too, are the same as in the other coaches, but with important additions in each case. In order to avoid the use of shunting locomotives at the ports a 230 amp-hr. traction battery is provided so that the vans can move under their own power on to the necessarily electrified quayside lines. This in turn opened the way to profitable use of the vans as light locomotives when not needed for boat train traffic, which is very peaky. In this role they are able to haul trains of up to about 100 tons and vacuum brake equipment has been provided to control the brakes on the trailing load. The brake on the van itself is controlled in the normal way from the air and electro-pneumatic driver's brake valve and a special valve then makes the train pipe vacuum vary in step with the brake cylinder pressure. Another newly developed valve assures the emergency features.

The traction battery is charged from the 200-volt output of a motor generator set driven from the 750-volt line; when it is required to provide traction power it is connected to the control gear and motors in place of the line supply by a contactor which is interlocked with the line switches to prevent both being closed at the same time. The van is therefore controlled in exactly the same way when powered by the battery as when powered from the line, but the performance is, of course, reduced. Selection of battery power is controlled by a push button in the cab, and reversion to line power may be obtained by operating a similar push button or by opening the master switch.

So long as the battery supply is selected, an indicator in each cab is illuminated and the collector shoes are pneumatically held clear of the conductor rail to allow exit from those unelectrified

work and is easily capable of hauling miscellaneous vehicles up to a tare of 100 tons. The fact that the van can operate away from the conductor rail for a period of 30 min. by means of the storage batteries, is an essential and most useful feature.

Later, in order to obtain still further experience, a similar trip was scheduled from Holborn Viaduct to Wrotham, at which station the railway handles a heavy flow of parcels consisting of books printed at a nearby printing works; on the return journey to Holborn Viaduct the train called at Swanley for an extended period to load up plant traffic from the local nurseries. These are examples of uses for the M.L.V.s when Continental business is at a low level.

#### URBAN MOTORWAYS URGED

##### At Municipal Engineers Convention

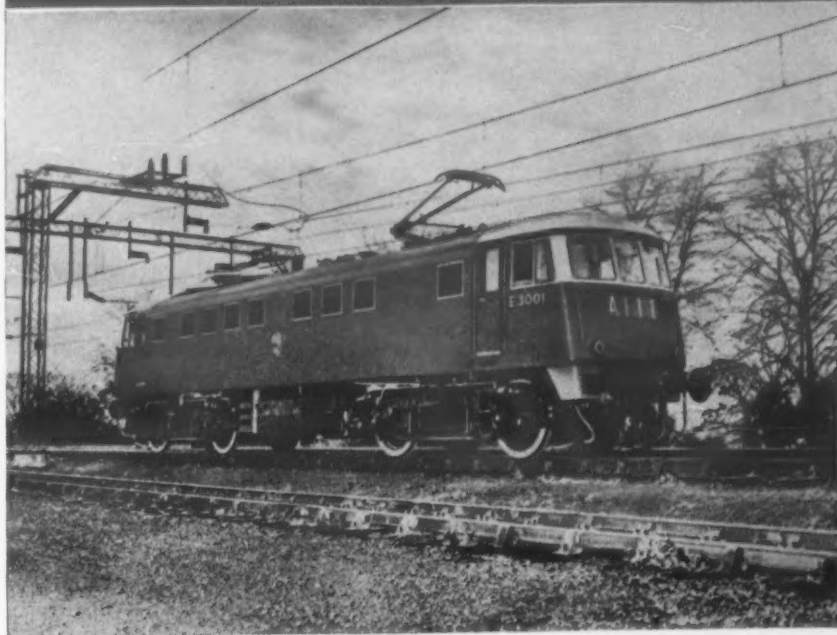
IN the opinion of many, there is only one way effectively and permanently to break the stranglehold which traffic is now applying to the antiquated roads of Britain's towns and cities; that is to build networks of urban motorways and provide adequate parking facilities in business areas off the motorways. What should be done now to provide on- and off-street parking will be discussed by five chartered municipal engineers at a convention organised by the Institution of Municipal Engineers to be held at Central Hall, S.W.1, on October 6. In the audience will be 900 delegates, including representatives from every major city and borough in the country.

The speakers will be Mr. John L. Beckett, Leicester city engineer, surveyor and planning officer, whose paper will be *Traffic and the Parking Problem*; Mr. A. W. Hogg, Westminster city engineer (*Control of Street Parking*); Mr. Granville Berry, Coventry city engineer and surveyor (*Roof-Top Parking and Mechanical Parking*); and Messrs. D. J. Howe, Brighton borough engineer and surveyor, and E. O. Baxter, Hastings borough engineer and surveyor (*Parking at Seaside Towns*).

Further information about the convention can be obtained from the Institution of Municipal Engineers, 84 Eccleston Square, London, S.W.1.

Mr. G. T. Smith, B.Sc.(Eng.), A.F.R.Ae.S., has been appointed sales manager of the aero-engine division of Bristol-Siddeley, Limited. In this capacity he will be responsible for the sales promotion of all Bristol Siddeley aero-engines throughout the world. Mr. Smith succeeds Air Commodore H. M. Pearson, who has relinquished the sales managership to take up a new appointment which involves extensive travelling overseas on prestige and sales promotion.

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Left: Mk 166 reclining passenger seats. Illustrations show one of a batch of double seats complete with ashtrays and parcel nets supplied to Gloucester Railway Carriage and Wagon Co. Ltd. for East African Railways.



Right: Drivers' seats adjustable vertically and horizontally. Illustrations show a new Busella (Mk 120), a tip-up type, which are supplied for the latest types of British Railways diesels.



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## LETTERS TO THE EDITOR

## Riding of Electric Trains

The Editor is always glad to receive letters from readers on subjects germane to the transport industry, but these should be written as concisely as possible. The opinions expressed therein must not, however, be regarded as having editorial endorsement. Where correspondents desire to use a nom-de-plume it is essential that the Editor should be informed of the name and full address of the writer as indication of good faith.

SIR.—It was distressing to read Mr. Faulkner's letter (August 20) about the riding of multiple-unit trains. It forces one to the conclusion that, in attacking the problem of bad riding, the Southern's mechanical engineers genuinely believe that they are making the best use of existing knowledge on the subject.

Evidence that this problem was overcome several years ago is provided by the high standard of riding given by most postwar Netherlands, French and German multiple-unit trains, even when running over intensively used track. The methods used have been well-publicised over the last four or five years (including some excellent mathematical treatments) and it is clear that, to ensure good riding, a bogie must incorporate 10 particular design features.

Of the Southern electric trains, all the suburban and most of the express sets are fitted with bogies virtually identical with the original L.S.W.R. design of 1916 and bad riding and rapid wear must be expected. Admittedly in the latest bogies, two (roller bearings and hydraulic dampers) of the 10 essential features have been superimposed on the 1916 design, but they can have little effect on their own.

Well-designed bogies ride well even on indifferent track, but poor designs soon spoil the best track. In particular, lateral hunting produces heavy intermittent side wear on the rails; this in turn results in worse riding and worse wear. Such bogie hunting can be cured by more rigid guidance of the axleboxes and bolster in the bogie frame, together with increased pivot friction.

Regarding Mr. Faulkner's point (3) the effects of restricted suspension displacements can be overcome to a surprising extent. In any case the routes with restricted lineside clearances are not numerous enough to justify spoiling the riding qualities of all the electric stock for the convenience of being able to use any set on any route.

Point (4) correctly states that a train tends towards instability when being pushed, but a fuller examination shows that the unstable effects are negligible. This is borne out by the fact that a two-car set rides no better with the motor bogie in front than with it pushing from the rear.

It is to be hoped that Mr. Faulkner's reference to trial and error methods does not mean that they are the main line of attack, for without fantastic luck, it is bound to be an impossibly lengthy way of finding a solution.

Some improvement can certainly be expected from the use of Commonwealth bogies, but they start with the major fault of being too heavy for use under light suburban bodies over any but the very best track.—Yours faithfully,

D. S.

## Early Trolleybuses

SIR.—In your latest instalment of the extremely interesting article on the "Development of the Trolleybus" (MODERN TRANSPORT, September 24) there appeared one or two points which I think are worthy of comment. The original Leeds route to Farnley was never extended to Drighlington; although powers for this and other extensions were obtained, the only other "railless" service operated by Leeds was from Guiseley tram terminus to Otley and Burnley-in-Wharfedale.

The description of the original Bradford route should read, "from Laisterdyke, via Sticker Lane to Dudley Hill (Wakefield Road)." In the same issue the B.U.T. E.T.B.I. Type trolleybus chassis now on exhibition at Earls Court is described as having its traction motor mounted "ahead of the front axle"; this should, of course, be the rear axle.—Yours faithfully,

J. S. KING.

23 Syke Road,  
Heaton, Bradford.

## New Vehicle Registration Scheme

SIR.—It is greatly to be hoped that the proposed registration number scheme for new vehicles will be amended before it comes into operation next January. The proposals at present, which are to use four letters and three numbers, suffer from four disadvantages: (i) difficulty in fitting the square back plate of motorcycles (at present, special blocks of three digit-three letter numbers are used in preference to four digit-two letter numbers); (ii) a considerable number of combinations of four letters forms words not suitable for use; (iii) a vast degree of wastage, since the three-letters plus three-numbers scheme is to be abandoned while far from exhausted; and (iv) perhaps the greatest drawback is that nothing is done to correct the anomalies by which the pairs of letters indicating origin of registration, are issued (for example, Staffordshire has only two pairs, the same number as Westmorland).

It is these anomalies which have led to the need for a new scheme now. Obviously some reallocation between registering authorities is essential, and should be carried out without delay: the degree of reallocation should depend on the numbers of registrations issued in, say, 1959. But in any case, it would surely be far superior (and far more logical) to use a combination of three letters and four numbers as a successor, and not a replacement to the present system.—Yours faithfully,

D. BRENDAN CHANDLER,

c/o Students Union,  
Broad Street, Aberdeen.

## FORTHCOMING EVENTS

Until October 1.—Commercial Motor Show, Earls Court.  
October 3.—S.E. W. A. Crago, "Some Notes on Hovercraft." Geological Society, Burlington House, W.1. 5.30 p.m.  
October 3-7.—British Railways Electrification Conference, London.  
October 4.—South Wales and Mon. R.D.L.D.S. (Cardiff). A. J. Nicholas, "Hong Kong." Angel Hotel, Cardiff. 6.30 p.m.  
Inst. T. (Midland). D. L. Munby, "The Problem of the Roads." Engineering Centre, Birmingham. 6.30 p.m.  
October 5.—Rly.S.A. Annual general meeting. London School of Economics, Houghton Street, W.C.2. 6.15 p.m.  
Inst. P. J. S. Elliott and E. D. Edwards, "Synthetic Lubricants for Gas Turbines." 61 New Cavendish Street, W.1. 5.30 p.m.  
October 6-16.—International Motor Show (including commercial vehicles). Paris.  
October 7.—Rly.C. W. J. A. Sykes, "Southern Region Electrification." Royal Scottish Corporation, Fetter Lane, E.C.4. 7 p.m.  
Inst.H.E. H. Bowdler, "Lessons Learned on the Design, Construction and Maintenance of Motorways—(i) From the County Surveyor's Angle." 11 Upper Belgrave Street, S.W.1. 5.30 p.m.  
October 8.—P.W.I. Visit to Jodrell Bank radio telescope and electrification works between Crewe and Manchester Oxford Road.

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## EARLS COURT REVIEW

### Improved Efficiency The Keynote

#### VEHICLES DESIGNED TO MAINTAIN THE BOOM

COMMERCIAL vehicle production and export figures for the month of August, released by the Board of Trade on Thursday of last week, gave an excellent send off to the Commercial Motor Show, which was opened on Friday by the Minister of Transport. While the car-producing section of the industry has met setbacks during the past month or so, the commercial vehicle markets, both at home and overseas, have not only remained buoyant but have experienced something of a boom. August, 1960, production was 27,619 goods vehicles and 1,301 passenger vehicles, compared with 23,149 and 1,147 respectively in August, 1959. Export figures for the same two comparative months were 11,719 goods vehicles, an increase of 3,300, and 573 buses and coaches, an increase of 180.

Collectively, Earls Court this week provides encouragement for the belief that this satisfactory state of affairs can be maintained. The show is as brilliant as any held since the war and as well supported by exhibitors, who number 422 and occupy 278,000 sq. ft. of stand space. In the 160,000 sq. ft. allocated to the vehicles them-



Sir Henry Spurrier (left) and Mr. Donald Stokes (right) show Mr. Marples exhibits on the Leyland stand

last-minute surprises are possible at present-day motor shows. Nonetheless, the opportunity of examining and discussing the various new ranges of chassis announced during the past few weeks, the numerous improvements and new ideas in bodywork and the hosts of recently developed components and items of service equipment is not lightly to be missed by anyone with an interest



Business end of the Daimler Fleetline and, right, the front-drive independently sprung Dennis Vendor delivery vehicle

selves are presented no fewer than 441 vehicles and trailers of all types and for every purpose, many of them duplicated in the outside park, where they are available for demonstration on the road. Thus the London exhibition maintains its position as the world's largest single demonstration of commercial road transport. As always in recent years, it is bound to attract the interest of transport men from all over the world and the recent upsurge in overseas orders indicates that the record attendance of nearly 4,000 foreign visitors, mostly traders and buyers, in 1958 might well be surpassed this year.

#### Minister's Opening Remarks

Performing the official opening ceremony, Mr. Ernest Marples, Minister of Transport, referred to the industry's well-designed and reliable products that have consistently earned foreign exchange; he had a special word of gratitude for designers and manufacturers of garage and maintenance equipment. They had shown great ingenuity, he said, in catering for the care, attention and maintenance without which motor vehicles would not

or a livelihood to be won in transport. Among the new chassis designs on display, two from the world's biggest exporters in their respective fields promise to consolidate that position by becoming best sellers.

#### Best Sellers

These are the new Leyland heavy-duty range, with Power-Plus diesel engines, and the new Bedford TK range, which provides all the advantages of the compact and manoeuvrable forward-control layout without its disadvantages. Already order books are reflecting the customer appeal of these new vehicles in overseas markets. Bedford dealers and distributors have now had time to assess the sales potential of the new range and production for 12 months ahead is already completely sold. Leyland's new Power-Plus engines, which by virtue of a new combustion system provide a 33 per cent increase in specific horsepower and reduction in fuel consumption of up to 10 per cent, proved the deciding factor in the award to Leyland Motors, Limited, of a £280,000 contract by South African Railways for



The Thompson-Leyland chassisless B.P. Autotanker looks unbelievably small compared with conventional 4,000-gal. tankers

function efficiently and might therefore become a danger on the roads. The Minister stoutly defended the vehicle testing scheme against suggestions that it should be dropped because accidents known to be caused by mechanical defects were few.

In asking designers to consider a concentrated study of ergonomics to the requirements of drivers of all motor vehicles, Mr. Marples appeared rather out of touch with reality or was at any rate addressing the wrong section of the industry. If all the first-class design work that has evolved the modern commercial vehicle cab, with its excellent visibility, adjustable form-supporting seating, convenient positioning of controls and instruments, sound insulation, fume and dust proofing, heating and ventilation and in the most recent examples easier access is not ergonomics at its most effective, then perhaps there is another less ugly word for it. Certainly, the plea was made before the Minister had made his round of the stands; it has substance only insofar as the range of adjustment of driving seats could be improved in certain commercial vehicles.

For a variety of reasons, including high costs of production tooling for new vehicles and keen competition in most markets necessitating extensive testing of new machines under actual service conditions, which precludes complete secrecy, few

70 three-axle trailer-hauling lorries and buses.

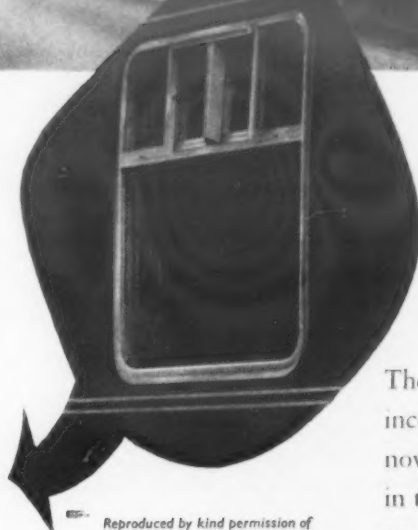
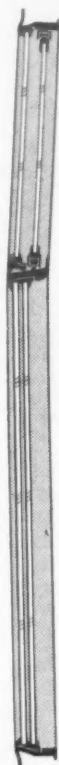
This is not the only nor the largest of the eye-of-show Leyland export orders, which also included one from Israel valued at over half a million pounds for 165 Worldmaster buses and 150 of the smallest of the Power-Plus diesels—the O400S of 125 b.h.p.—for fitting to existing American buses; and one valued at £400,000 for a new refuse collection scheme for the Iranian capital, Tehran. An important overseas order was also booked by the British Motor Corporation for half a million dollars' worth of Austin diesel-engined bus chassis for the Saigon Municipal Bus Company. Bodies for the 153 vehicles involved will be built locally, but a complete bus with Marshall-Mulliner 45-seat body on a similar Austin chassis has also been ordered for evaluation. All of these orders have been won in the face of fierce international competition.

Looking unbelievably small in relation to other 4,000-gal. capacity road tankers ranged nearby, the rear-engined chassisless B.P. Autotanker—joint work of Thompson Bros. (Bilston) and Leyland Motors—brings a new approach and a new look to this field of road transport. Perhaps rather heavier at about 9 tons unladen than its sponsor envisaged, this weight includes full equip-

(Continued on page 12)



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## GLASGOW SUBURBAN ELECTRIFICATION

### Part of a Bold B.T.C. Scheme

**S**PEAKING at a display of locomotive and rolling stock staged at Glasgow Central Station in September, 1959, Sir Brian Robertson, chairman of the British Transport Commission, stated that in the light of known difficulties the Commission was adopting a very bold policy towards Scotland, and certainly no other project exemplifies the truth of this remark so forcibly as the electrification of the suburban services in Glasgow, now being carried out by the Scottish Region under its energetic area board and Mr. James Ness, the general manager.

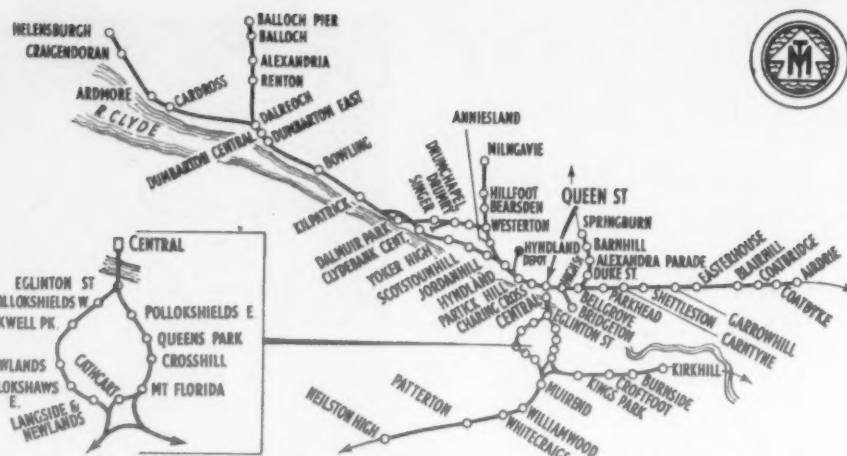
Altogether the scheme involves the electrification of some 70 route-miles, 52 of which are on the north side of the Clyde and 18 on the south side. The lines concerned serve some 70 stations and are operated by 77 signalboxes, to be reduced to 34 when the scheme is completed. The scheme is being carried out on the 50-cycle a.c. system using 6,250 volt line voltage in the central area and 25,000 volt elsewhere, with colour-light signalling on all running lines. The services will be run with three-coach sets coupled together as required to make up six-

been achieved by lowering the level of the track.

It is calculated that some 63 per cent of the track included in the scheme is curved, and in many cases the higher speeds envisaged have required new alignments and recanting. The electrical control station for the area has been sited at Cathcart in a self-contained building designed and equipped on the most up-to-date lines. Track layout alterations have been necessary at Bellgrove, Helensburgh, Heathershallow, Bridgeton Central and Glasgow Central, where the approaches have been re-designed. The Queen Street Low Level station has been altered from a four platform station to one of two platforms by the abolition of the two north side tracks. The centre island platform has been taken out and the remaining platforms widened. The modernised structure will be known as Queen Street Electric.

#### New Stations and Boxes

A new rolling stock maintenance shed has been built at Hyndland, together with a staff amenities and office block and suitable siding accommoda-



Phase I of the Glasgow suburban electrification, north of the Clyde, is due to open on November 7, while the second portion, based on the Cathcart Circle, will be in service towards the end of 1961

on the south side at Kings Park and Muirend. Power supplies will be taken at 25 kV single phase, 50 cycles, from the Electricity Authority network through duplicate feeders at Parkhead, Dalreoch, Motherwell and Eglinton Street feeder stations. In the Airdrie area a sub-feeder station will be located at Coatbridge, and there will be a similar installation at Cathcart. All feeder stations and cabins

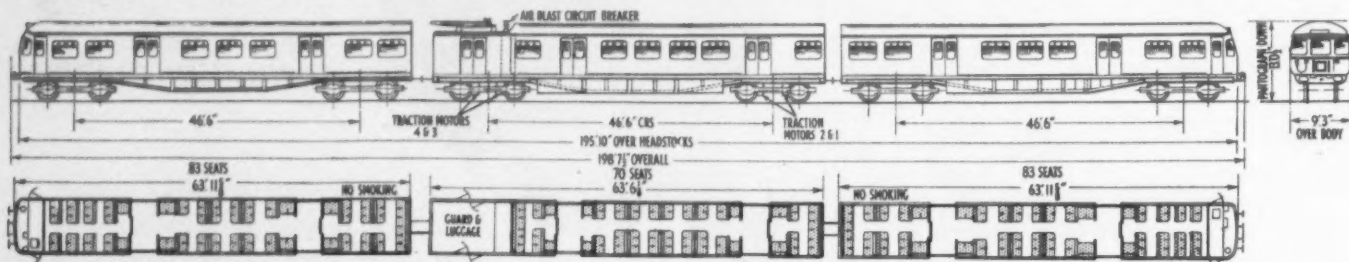
The bodies have been built by the Pressed Steel Co., Limited, at Linwood near Paisley, and the electrical equipment has been supplied by Associated Electrical Industries, Limited, of Trafford Park, Manchester.

#### Services

The new services over all the electrified lines north of the Clyde are due to commence on November 7, and are based on a pattern of regular interval trains throughout the day. The pattern of the services will be as follows: Two trains each hour from Helensburgh to Airdrie, two trains per hour from Balloch to Bridgeton, two per hour from Dalmuir Park to Airdrie, and two per hour from Milngavie to Springburn. They will operate from about six o'clock in the morning until nearly midnight, with supplementary trains on all routes during the morning and evening rush hours.

On average the new schedules will cut journey times by 25 per cent, whilst there will be approximately three times as many trains on each service. The effect of the interval pattern will be to build up the frequency in Central Glasgow to a maximum of eight trains an hour in each direction through Queen Street.

The Helensburgh-Glasgow services may form an example of what is being done on the Glasgow Electric. On weekdays, 24 steam trains are being replaced by 37 electric. From Helensburgh there will be two trains an hour starting at 6.15 a.m. and continuing at half-hourly intervals thereafter until the last train at 10.45 p.m. These services will be supplemented by three additional fast business trains at 8.10 a.m., 8.29 a.m. and 9.5 a.m. In the reverse direction from Glasgow, the trains for Helensburgh start from Queen Street at 6.14 a.m., then 6.44 a.m. and at half-hourly intervals thereafter until the last train at 11.14 p.m., again supplemented by two fast business trains at 5.2 p.m. and 5.32 p.m. Mondays to Fridays, and at 12.10 p.m. and 12.16 p.m. on Saturdays. On trains stopping at all stations, the electric journey time will be 51 min. from Helensburgh to Queen Street, steam services took 64 min. so the saving is 13 min. On express trains, the saving will be less, but will amount to 7 to 13 min.



Layout of Scottish Region Glasgow suburban electric set; 91 are being built by the Pressed Steel Company and equipped with A.E.I. electrical gear for the Glasgow Electric

or nine-coach trains. The first phase of the scheme on the north bank of the Clyde is expected to come into operation later this year, and on the south side services are scheduled to commence during the latter half of 1961.

#### Principal Engineering Works

The decision to use the 50-cycle a.c. system has meant a great deal of civil engineering work, mainly on overhead clearances. At 119 overbridges and footbridges on the north side of the Clyde and at 63 on the south side the requisite clearance for the electrical equipment was not available, so that in the majority of cases these bridges have had to be reconstructed. As the cost of providing sufficient clearances for the standard 25,000-volt working would have been prohibitive in the central area where much of the line is in tunnel, this part of the scheme has been designed for operation at 6,250 volts, and in most cases the necessary clearance has

been achieved by lowering the level of the track. A new station on the main line between Partick Hill and Anniesland will replace the old station and in future the spur will be used solely for depot purposes. A new station has also been built at Garscadden between Scotstounhill and Yoker. New signalboxes have been built at Airdrie, Bowling, Helensburgh, Bellgrove and Balloch, and new power signalboxes at Dumbarton and Hyndland. On the southern half of the scheme a new power signalbox has been constructed at Glasgow Central, and new boxes are planned for Muirhouse and Cathcart.

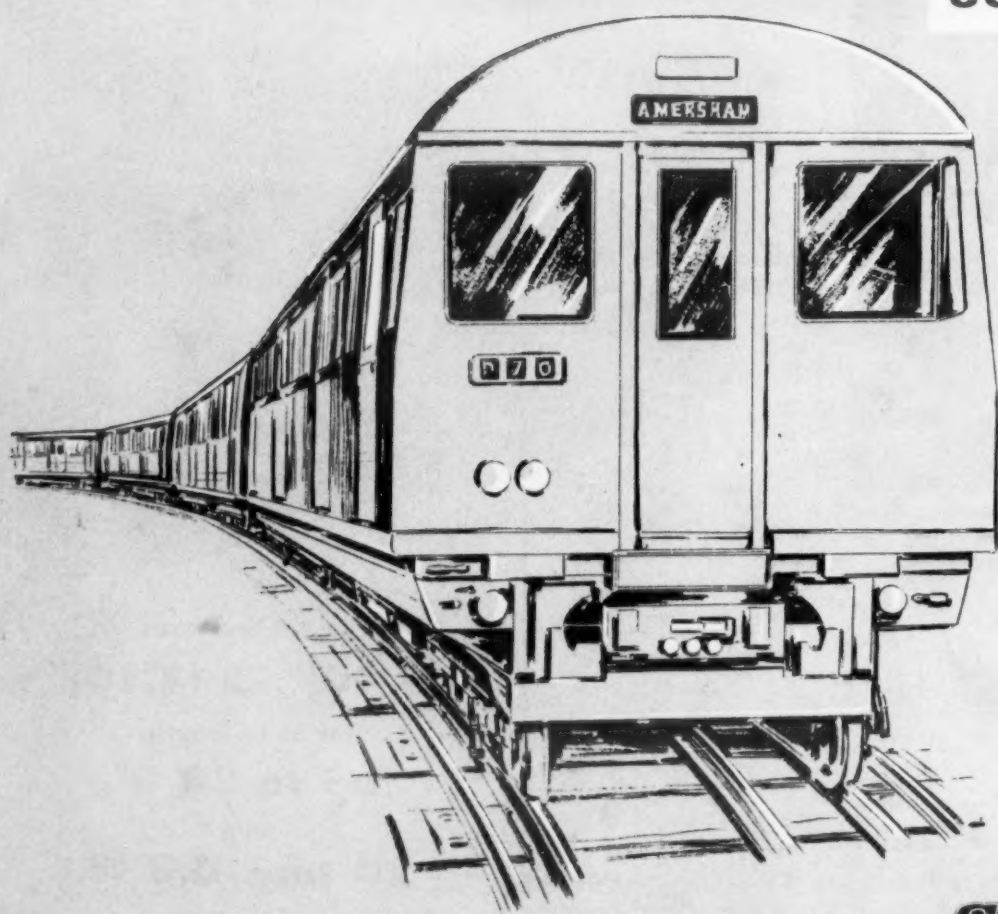
Overhead equipment consists of simple catenary construction where speed restrictions are 60 m.p.h. or less, and compound catenary construction where speeds will exceed 60 m.p.h. Neutral sections are installed where there is a change of voltage or a change of phase in the electric supply. On the north side the change in voltage will take place at Dalmuir Park, Westerton, and Parkhead, and

will be unattended and controlled from the electrical control station at Cathcart.

#### Multiple-Unit Stock

The rolling stock consists of three-coach sets comprising two trailer coaches with a non-driving motor. These sets may be operated singly or in duplicate and triplicate to form six- or nine-car trains. The coaches are of the saloon type, each with two pairs of air-operated double doors controlled by the guard from his compartment in one of the non-driving power coaches. Traction is derived from four axle-hung d.c. motors each with a one-hour rating of 220 h.p.

The new stock is finished in Caledonian blue livery and has a commendably smart appearance. It is the first electric stock in Britain to adopt the clear forward view for passengers as used on many diesel railcars, and is fitted with a modified Gresley type bogie that gives excellent running qualities.



## ELECTRIC ROLLING STOCK

### LIGHT ALLOY CONSTRUCTION

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## ELECTRIC TRACTION ON EASTERN REGION

### Suburban and Outer Suburban Projects

ELECTRIFICATION projects in hand on the Eastern Region, which are to be visited by delegates to the British Railways Electrification Conference, cover suburban and outer suburban areas; the Colchester and Clacton scheme, when linked to Liverpool Street, will represent main-line conditions, although it may be anticipated that housing developments will follow the live wire and soon operate to make Walton, Frinton and Clacton extra-suburban seaside appendages of the metropolis. True main-line operation would be associated with possible extension beyond Bishops Stortford to Cambridge and Whittemoor marshalling yard, or from Colchester to Harwich (for Continental boat-train services), Ipswich and beyond. The Eastern Region has also in mind the electrification of Great Northern Line suburban services, with the interesting possibility of using the 16-ft. Great Northern and City tube to Moorgate as a terminal, and electric traction on the Great Northern main line from Kings Cross to Peterborough, Doncaster, the West Riding and the East Coast route northward.

#### Work in Hand

From Liverpool Street to Shenfield was electrified on the 1,500-volt direct current system in 1949 and was extended to Southend Victoria subsequently, as well as from Shenfield to Chelmsford on the main line. The Liverpool Street—Southend section is, as will be seen from the diagram, to be converted to 6,250-volt 50-cycle single-phase a.c., while Shenfield to Chelmsford will be re-equipped for 25,000-volt operation. This involves the suspension of electric service for four months and the substitution of through electric trains by diesel shuttles. The 6,250-volt change can be made with existing equipment, except on the signalling side, where it is necessary to adopt 83½-cycle a.c. for detection and track circuits in lieu of 50-cycle a.c., so as to be immune from d.c. interference now and 50-cycle traction current interference later. On freshly electrified 50-cycle routes where this complication does not arise d.c. track circuits can conveniently be employed. On November 21 electric trains are

every 10 min. in the off-peak, with numerous fast trains. Chingford stopping trains will call at Highams Park, Wood Street, Hoe Street, St. James Street, Clapton (connecting with Lea Valley diesels), Hackney Downs (connecting with Enfield Town, Hertford East and Bishops Stortford lines) and Bethnal Green.

#### Hertford and Enfield

A 20-min. service will be given to Hertford East during peak hours and a 30-min. service at other

Southend Central—Shoeburyness a.c. electrification, due to begin next year, have been built early and will begin service in November between Liverpool Street and Southend Victoria via Shenfield. The L.T.S. stock provides 19 first-class and 344 second-class seats in each four-car unit. All the first-class seating is in compartments and the second-class accommodation is divided between open saloons and compartments. Standard B.R. swing doors are fitted.

Electrical equipment is by English Electric and

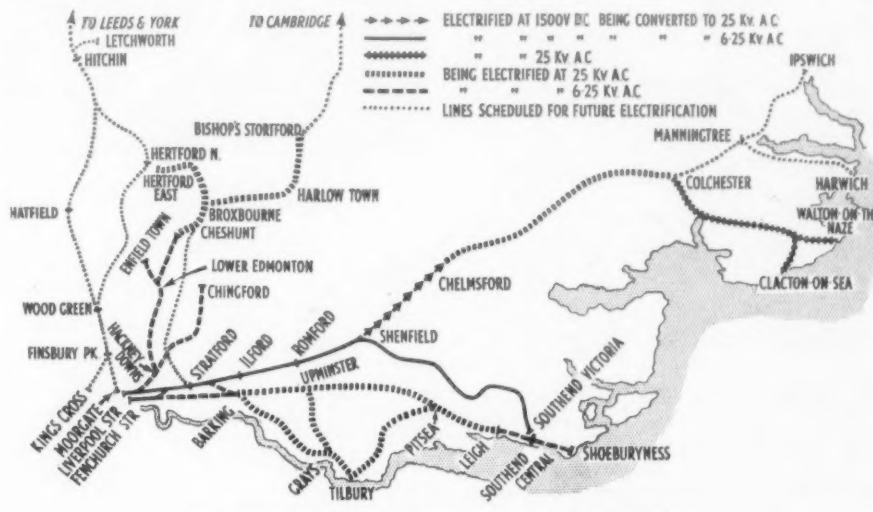


Diagram of Eastern Region routes now being electrified

times. Hertford stopping trains will call at Ware, St. Margarets (for Buntingford line), Rye House, Broxbourne, Cheshunt, Theobalds Grove, Turkey Street, Southbury, Lower Edmonton and Liverpool Street. At Cheshunt electric trains will also connect with the Lea Valley line for Waltham Cross, Enfield Lock, Brimsdown, Ponders End, Angel Road, Northumberland Park, Tottenham (Lea

each motor coach has a main transformer and four air-cooled mercury-arc rectifiers. The two motor bogies each have two 208-h.p. d.c. self-ventilated traction motors. Voltage control is achieved by tapping on the secondary windings of the main transformer and the same results are obtained whether a.c. current is taken at 6,250 or 25,000 volts. Coach lighting is on a 110-volt d.c. supply



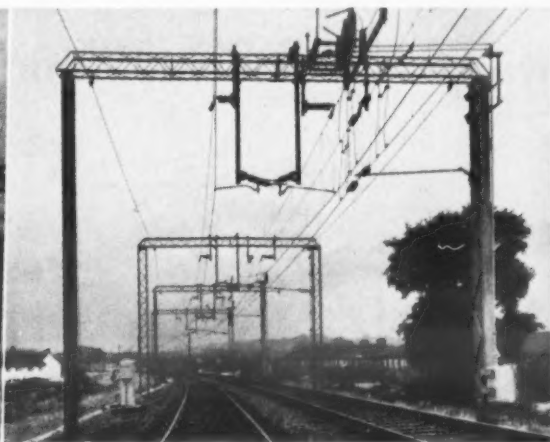
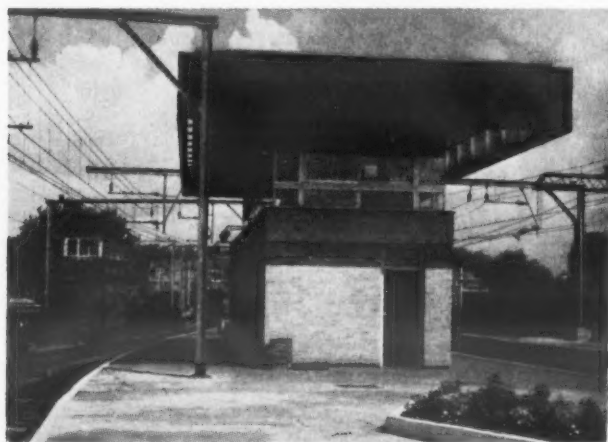
Chingford and Enfield open second coach

whom are, like the first class, in compartments. Both types of train have G.E.C. electrical equipment including eight liquid-cooled mercury-arc rectifiers. Double bolster bogies are provided and each motor bogie has two 280 h.p. continuous rated self-ventilated traction motors, the voltage control of which is achieved by tapping on the secondary windings of the main transformers. Westinghouse electropneumatic braking is used. Lighting equipment is similar to that on the L.T.S. trains, but fluorescent equipment is provided for the inner suburban stock. A special winding on the main transformer gives 240 volt a.c. current for the totally enclosed heaters. Coach sides and floors are heat insulated with glass fibre or sprayed asbestos.

#### Civil Engineering Work

Before the full advantages of high acceleration rates and fast running can be obtained from electric traction, track reconditioning has had to be carried out either by ballast cleaning or complete reballasting. Where necessary on clay formations, blanketing has been done with sand or ash to avoid slurry working up into the ballast. Other remedial work includes stabilisation of slips on cuttings or embankments. Long-welded rails with 20 per cent more jarrah sleepers than ordinarily employed or concrete sleepers are laid wherever possible to avoid rail joints. Cast manganese crossings are installed at busy junctions and track layouts have been extensively remodelled to accommodate a new traffic pattern and to provide for elimination of track facilities required for steam operation but now redundant.

Employment of 6,250-volt or 25,000-volt current involves considerable bridge reconstruction, and a safety requirement is the provision of additional parapets on road bridges over the line. Originally 6-ft. solid parapets were required above road level, but now the 5-ft. dimension, and in certain circumstances fine wire mesh screens, are acceptable. Load gauges have had to be provided to warn road



Scenes on the North East London electrification: Hackney Downs signalbox; neutral section on the Southbury loop near Cheshunt Junction providing for change from 6,250 volts tension on the London side to 25,000 volts on the country side; right, new colour light signal on gantry at the Cambridge end of Bishops Stortford Station

due to begin service from Liverpool Street to Enfield Town and Chingford and from Liverpool Street via Lower Edmonton and the Churchbury loop (now the Southbury line) to Broxbourne, the Hertford East branch and as far as Bishops Stortford on the Cambridge main line. The other Eastern Region electrification in hand for completion next year covers the whole of the London, Tilbury and Southend line except the Upminster—Romford branch and the freight line to Thames Haven, as shown on the sketch map, which also shows the voltages to be employed in the various sections.

The revolutionary new timetable which will be introduced when the big changeover from steam takes place shows an all-round improvement in train services with big cuts in journey times. At Lower Edmonton, for example, the existing service to Liverpool Street will be stepped-up from two trains an hour in off-peak periods to an average of eight an hour throughout the day. What is more, non-stop trains to London from this station will cut the present 34 min. journey to 15. Fast trains from Chingford to Liverpool Street will take 23 min. instead of 35.

#### Train Services

A particularly interesting feature of the electrification programme will be the reopening for regular passenger traffic of the former Churchbury loop, now renamed the Southbury line. Opened in 1891 the former Great Eastern Railway closed it to passenger service in 1909 owing to sparse traffic and reopened it only for wartime services in 1915-19. Freight continued to operate throughout the years and it has been a useful diversionary route. It leaves the Enfield Town line at Bury Street Junction, Edmonton, and links it with the Cambridge main line at Cheshunt, five miles away. Back on the map again will be three newly renovated stations—Southbury (formerly Churchbury), Turkey Street (Forty Hill) and Theobalds Grove. With the introduction of the new services all electric trains from Bishops Stortford and Hertford East will travel over the Southbury line to Liverpool Street, calling also at Lower Edmonton.

To Bishops Stortford there will be a 20-min. electric train service during peak hours and half-hourly in off-peak periods. Bishops Stortford stopping trains will call at Lower Edmonton (connection for Enfield Town), Southbury, Turkey Street, Theobalds Grove, Cheshunt, Broxbourne, Roydon, Harlow Town, Harlow Mill and Sawbridgeworth. Service will be augmented during peaks by other trains (diesels) running via the Lea Valley to Clapton and Liverpool Street or to Stratford. On the Chingford line there will be nine trains an hour during peak periods and a train

from a selenium rectifier which is mounted on the so-called battery trailer car of the set and which also charges the emergency batteries. Full lighting is maintained by the battery when passing through a neutral section in the overhead. Westinghouse electropneumatic braking is provided. Guards and drivers can communicate by bell or by Loudaphone.

#### North-East London Rolling Stock

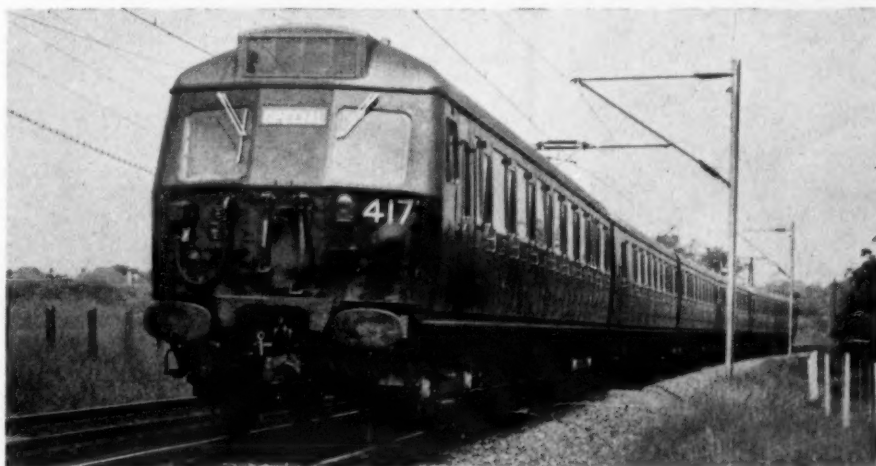
The coaches for the North-East London electri-

vehicle drivers at certain level crossings that overhead wires have to be avoided. The raising of bridges has in some cases been covered by rebuilding the central span, the side spans not now needed being stabilised by building diaphragm walls before removal of the centre spans. Partially pre-stressed construction to a design pioneered by the Eastern Region has been used for the new bridge decks and gives a low depth-to-span ratio. These road rearrangements have been carried out in conjunction with the local authorities. Underbridges in general have not been reconstructed for electrification purposes, but where renewals were imminent, they were carried out in advance of programme in order to avoid disruption of the new services.

#### L.T.S. Works

Principal works on the London Tilbury and Southend line have been the Barking flyover, already detailed in our pages; the new hump yard at Ripple Lane; and the segregation of London Transport tracks between Campwell Road Junction and Upminster. To accommodate 12-car trains, platforms have had to be lengthened at 12 stations, while out of some 128 overbridges on the L.T.S. it was necessary to reconstruct 40 road bridges and 21 foot bridges. In addition track was lowered at 17 sites, and 4 miles of line were blanketed; ballast was cleaned over 100 miles of track and loading gauges were provided at two public road crossings. On the North-East London lines the reconditioning of the Southbury Loop and the rebuilding of the stations at Harlow and Broxbourne were major works and an overhead line maintenance depot has been built at Cheshunt. Carriage washing machines with cleaning sidings are provided at Enfield, Chingford and Hertford East and there are sidings at Bishops Stortford. At 27 stations platforms were lengthened to accommodate either eight-car or nine-car trains. Of 80 bridges, 30 overbridges were reconstructed, 14 raised; the track was lowered at 12 bridges and four tunnels. There are seven new concrete foot bridges and three new station bridges. There are level crossing gauges at three public roads. Blanketing was carried out on 12 miles of track, while over 20 miles the ballast was cleaned.

On the Chelmsford—Colchester section two public roads now have level-crossing gauges, six miles of track were blanketed and 30 miles reballasted. Complete reconstruction took place at 11 out of 29 bridges; four were reconstructed with a relieving arch and at six places the track was lowered. There were also five new foot bridges and platform extensions at Witham (for 12 cars) and Hatfield Peverel (for eight-car trains). The station rebuilding at Colchester, begun before the war, (Continued on page 25)



Two Chingford and Enfield three-car trains coupled on trial running between Rye House and Hertford

Cambridge will run approximately every 20 min. during peak periods, making a first stop at Bishops Stortford.

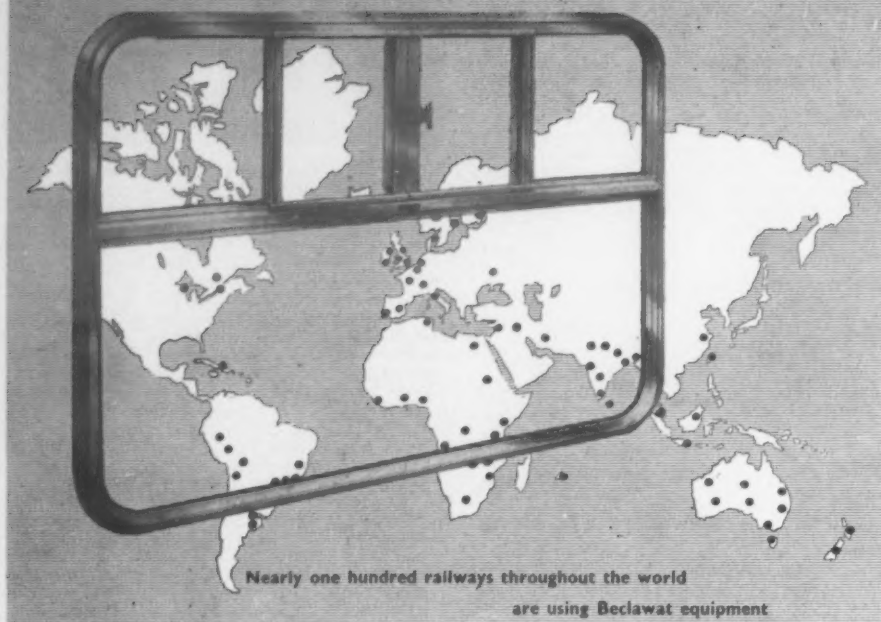
#### Rolling Stock

The Liverpool Street—Shenfield stock was of the open-car type with power-operated doors. It is formed in three-car sets and is operated in multiple units of up to nine cars; in those circumstances 528 seats and considerable standing room is provided. The Southend stock is formed in four-car sets; accommodation includes both compartments and open saloons with hand-operated side doors between each pair of seats. There are lavatories and first-class compartments. To relieve these trains while they are being refitted for a.c. power supply with rectifiers the 121 sets for the Fenchurch Street—

fication have been built in British Railways workshops at York (52 three-coach sets for the Liverpool Street to Enfield and Chingford services) and at Doncaster (19 four-coach sets for the Liverpool Street to Bishops Stortford and Hertford East operations). The three-car inner suburban trains comprise driving trailer coach; motor coach with guard's van carrying the pantograph; and battery driving trailer coach. In the four-car units, which provide 19 first-class seats in compartments with lavatory accommodation, a trailer composite coach is placed between the battery driving trailer and the motor coach. The three-car trains are 199 ft. 6 in. long and seat 272 second-class passengers in open saloons. The four-car unit is 265 ft. 8½ in. in length and besides first-class accommodation seats 444 second-class passengers, some of



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## Earls Court Review

(Continued from page 9)

ment for a six-compartment all-products tanker and the vehicle can carry a full 4,000 Imp. gal. of liquids up to something above 0.8 s.g. within the 24 tons gross limit.

The development is a courageous and important one, apart from its technical interest for employment of a rear engine, pneumatic front suspension and a semi-automatic S.C.G. gearbox in combination with a two-speed axle. While out of the question for the main run of goods vehicle, other

national, this company exports about half of its production, which now approaches 7,000 vehicles a year from 3 tons capacity upwards. A range extension was also announced at the show by Ford Motor Company in the shape of an uprated Thames Trader 75, which can carry a 7½-ton payload in a gross vehicle weight of 25,000 lb.

Among the new heavyweights are the two Scammell matched articulated vehicles, one notable for its horizontal back-to-front engine and



Detail of Girling disc brakes applied to front axles of an E.R.F. eight-wheeler; right, the Girling disc brake and air-suspension unit can be seen in this interesting picture of the Guy Wulfrunian

than delivery vans, because of the wide diversity of application, it could be that the economies and weight saving possible with integral construction, spurned by the majority of British bus operators, except London Transport and Midland "Red," is about to be exploited by the larger bulk carriers of liquids, powders and grains. We ponder on what might be possible in this field using a mathematical basis for design as outlined by a special contributor in our last issue.

But it is not only the spectacular that signifies advance and many manufacturers have something new to interest visitors. Dodge Brothers (Britain) shows its widest range ever, with new vehicles in the 9 tons capacity class which will undoubtedly prove attractive to its wide circle of confirmed users. Under the auspices of Chrysler Inter-

both having redesigned bogie suspensions providing improved stability, the massive Thornycroft Antar Sandmaster with a fuel range of over 2,000 miles and the new 23-ton gross two-axle tipper or dumper; an E.R.F. eight-wheeler with Girling disc brakes fitted to both front axles; and a Crane low-bed trailer with the company's own design of mechanically operated disc brake applied to the four rear wheels. The unique Crane design employs an inside-out disc attached to the hub through a peripheral flange; a mass of peripheral metal projects clear of the tyre section, providing high heat capacity and a good radiating surface to the air stream.

### Increased Power

New or more-powerful engines account for quite a large proportion of the novelty in the heavier ranges. The Leyland Power-Plus has already been mentioned and Thornycroft too has improved the output of its Q and K series engines to the benefit

## STC and Railway Modernisation

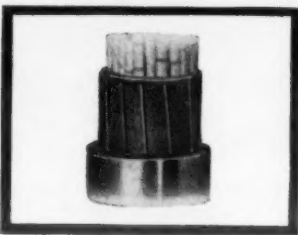
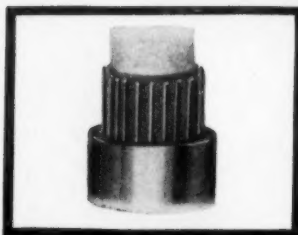


A large consignment of communication cable being loaded at the STC North Woolwich Works for rail transport to site near Glasgow.

### Specially screened communication cables for the Glasgow Suburban Electrification project

STC are manufacturing and installing communication cables for the Scottish Region of British Railways. A feature of these cables is the in-built screening to reduce the voltages induced from the A.C. traction system. These lead-covered paper insulated cables for telecommunication and supervisory facilities are of 40 lb/mile conductors and contain from 8 to 54 Pairs.

STC are also supplying the loading and terminal equipment.



Another STC communications cable project for British Railways



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Seddon 7-tonner is powered by the new Perkins Six 354 direct-injection diesel

of the heavier haulage tasks and higher operating speeds. The K6S engine of 11.3 litres uses the Simms Eberspächer turbocharger; it develops a maximum of 230 b.h.p. and is notable for its excellent automotive torque characteristics. An important development by Fodens is the turbo-charging of its six-cylinder two-stroke diesel engine, using the C.A.V. unit, which is seen as the



The Minister samples London Transport's RM-type bus on the A.E.C. stand, under guidance of Mr. E. R. Hollands

Mark IV of outstandingly low specific weight and bulk powering the Foden three-axle dumper.

The Gardner horizontal 6LX diesel engine has found ready application in the new Scammell Trunkor five-axle articulator and will doubtless find others in passenger vehicles. The new Perkins direct-injection vehicle engine, the Six 354 of 112 b.h.p., is reputed to have created something of a furore among its "guinea-pig" pre-announcement fleet-trial users and production applications are seen in Dodge, Seddon and Dennis chassis.

The lower end of the capacity scale also presents its novelties, from the unique rubber-suspended front-drive B.M.C. light vans upwards. B.M.C. also introduces smaller and sleeker 10-12 cwt. stable companions for its established Austin and Morris 15-cwt. vans, while Standard provides a higher-powered version of its successful Atlas van. The Commer 1-ton forward-control van—the only one of its type offering alternative factory-fitted diesel or petrol power—appears in most of its 19 standard guises in various parts of Earls Court. The Dennis

(Continued on page 26)



# PRESENT STATE OF RAILWAY ELECTRIFICATION

## 5—Continent of Europe\*

By F. J. G. HAUT, B.Sc. (Eng.), A.M.I.Mech.E.

THE most important electrified main-line railway networks are to be found in Europe. Certain countries are already completely electrified; in others all main lines carrying the heaviest traffic are running electrically. The electric systems used were described in the first instalment. Austria, Belgium, Netherlands, Sweden and Switzerland are very extensively electrified, although the diesel engine plays a certain role on minor lines and for shunting purposes. In France, Germany, Norway and Italy many of the most important main lines are running under electric current. Spain has some important but disconnected lines electrified; in Denmark electric traction is looked upon as an agency for suburban

(3) Starting tests, hauling 1,200-ton freight trains on 0.8 per cent gradients and 950-ton freight trains on 1 per cent gradients, were made successfully. In speed tests the extraordinary maximum speed of 206 m.p.h. was reached by one of the locomotives, a world record.

Design details of these fascinating locomotives are as follows:

Length over buffers	62 ft. 11 in.
Total wheelbase	46 ft. 6 in.
Rigid wheelbase	15 ft. 11 in.
Wheel diameter	4 ft. 1 in.
Total weight, all available for adhesion	106 tons
Weight of mechanical part	42.1 tons
One-hour rating at 1,500 v.	5,000 h.p.
Corresponding tractive effort	36,300 lb.
Corresponding speed	49.7 m.p.h.

### 50-Cycle A.C. in France

But the French railway engineers were not satisfied with the various disadvantages of 1,500-volt d.c. system—numerous substations, transmission losses and heavy overhead installations—and when seeing the success of 50-cycle operation they built a test route with a variety of locomotives and decided finally on the electrification with 25,000-volt single-phase a.c. at 50 cycles of their Lille—Basel main line and others in the North East (see page 21). The latest locomotive to emerge for 50-cycle traction is worth mentioning because it has some features which are going to be used by British Railways.

These locomotives are numbered Series BB.16500. They are of the Bo-Bo type and have a variable gear ratio so that they can be used for passenger or freight service. Their total weight is only 66 tonnes. The electrical part is typical for other ignitron (single anode) rectifier locomotives. The two pantographs are of the Faiveley type, and there is an air-blast circuit-breaker. The h.t. transformer comprises an auto-transformer winding with a ratio of 25 to 15 kV; the main power transformer has a centre-tapped secondary and an auxiliary winding. The high voltage tap-changer (as developed in Switzerland) is servo-motor operated.

### Details of Drive

The transformer has a total rating of 3,665 kVA. There are four 10-inch diameter ignitron rectifiers which supply current to the two traction motors, which are permanently connected in parallel. Each bogie is powered by a single d.c. traction motor of 1,750 h.p. (continuous rating). Each motor is



Austrian Federal Railways Co-Co locomotive of the 1010 series

operation. A lead was taken in providing main-line diesel services in that country.

### France

Coming first to France, electrification goes back to the early Midi and Paris—Orleans and P.L.M. electrifications, either of heavy suburban traffic or mountain lines, dating back to 1895, when a famous engineer, Auvert, designed a power-rail system with locomotives for the P.L.M. Railway. Main-line traction started with the well-known Midi experiment when during 1902 and 1908 a 55-km. line was electrified and six test locomotives were ordered from leading builders; all had the wheel arrangement 2-6-2 and the current used was 12,000-volt single phase a.c. at 16½ cycles. Undoubtedly, the locomotive submitted by the firm of Jeumont was the most interesting one, as it had individual axle drive and proved a versatile



Belgian National Railways 3,000-volt locomotive of the 122 series

and reliable engine. As a result of the tests eight locomotives of 93 tons weight and the 4-6-4 wheel arrangement were ordered from Jeumont and Westinghouse which locomotives became well-known as the 2-Co-2 type with vertical motors. Between the two wars, the railway companies interested in electrification of main lines (P.O., Midi and P.L.M.) settled in favour of 1,500 volts direct current.

By the end of the 1939-45 war with its railway system largely in ruins and now nationalised, the French railways decided on a bold programme of electrification and motive power building. The greatest success was probably in the first instance the CC 7001 type, an all-bogie, all-adhesion locomotive of high power. So impressive were the achievements of these locomotives that 53 were ordered by France, 30 by the Netherlands and 80 for Spain. The locomotive, designed by the Electrification Bureau of the S.N.C.F. and the firm of Alstom, has a method of body suspension which dispenses entirely with the conventional bolster and pivot. Instead, the body is connected to each bogie by two vertical swing links, which move in opposite directions so as to permit the bogie to move relative to the body in curves, or both tilt the same way to allow some lateral displacement of the body from the bogie centre line. Two springs acting transversely return each link to the vertical after it has moved. This restoring force is designed to be proportional to the amount of movement of the front or rear end of the bogie.

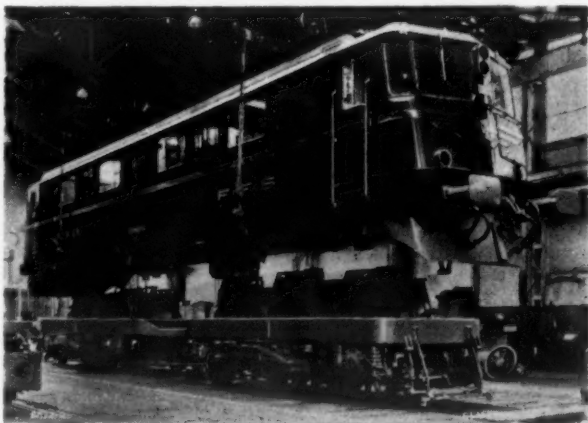
In several tests the following results were achieved, among others:

(1) Hauling a 1,000-ton (22 coaches) train, 335 km. (208 miles) in 3 hr. 9 min. This gives an average speed of 106 km.p.h. (66 m.p.h.), and was achieved without exceeding 120 km.p.h. (75 m.p.h.).

(2) Hauling a special lightweight 5-coach train, 579 km. (360 miles) in 4 hr. 26 min. An average speed of 138 km.p.h. (86 m.p.h.) was maintained for 232 km. (144 miles) and 131 km.p.h. (81 m.p.h.) was the average for the whole journey of 360 miles.

spring-borne on the bogie and drives the two axles of its bogie through a gear train, the flexible coupling being made by an Alstom floating ring. The gearbox enables either of two gear ratios to be selected by the movement of a lever. The higher gear ratio, for passenger-working allows a maximum speed of 87 m.p.h., while the low gear allows for a maximum speed of 52½ m.p.h. for freight working. In high gear the maximum tractive effort is 19 tonnes and in low gear 32 tonnes.

So that the wheels can be driven through a single centrally-placed gear wheel, the two axles have to be placed much closer together than is usual, and the wheel-base of each bogie is only 5 ft. 3½ in.

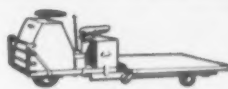


Swiss Federal Railways Ae 6/6 Co-Co locomotive showing power bogies and body carrying control gear

Stability has been obtained by use of the Alstom swing link, and the axleboxes are attached to the bogie frames by horizontal links mounted on Silentbloc bushes. Results so far obtained in passenger and freight working have been very satisfactory and the S.N.C.F. hopes to have found a mixed traffic locomotive which can work suburban trains, or, in multiple-unit, the heaviest goods trains. The main particulars of this locomotive are tabulated on page 18.

Characteristic histories of European railway (Continued on page 18)

## CONVEYANCER-SCOTT



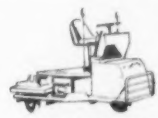
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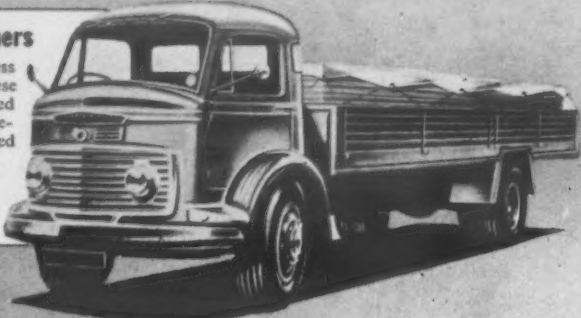
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# ROOTES FOR THAT TOUCH OF GENIUS AT THE SHOW

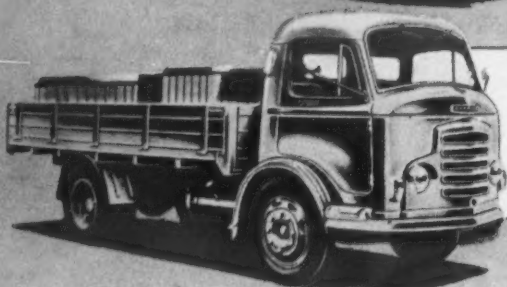
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## NEWS FROM ALL QUARTERS

### Moscow Underground Programme

By 1965 it is planned to extend the Moscow underground system from 49 to 86 miles in length and by 1975 a total mileage of 155 is proposed. The maximum speed attained by newest trains will be lifted to about 56 m.p.h.

### Road out of Canal Scheme

A scheme to convert about three miles of the disused Monkland Canal into a four-lane limited access highway from its commencement at Castle Street eastwards through Riddrie and Queenslie and thence on to Edinburgh Road, has been considered by Glasgow Corporation Highways Committee. It is a more comprehensive scheme than that put forward in 1951 and 1955.

### Traffic-Free Shopping Areas

Swindon is to have a traffic-free shopping precinct including 28 shops, three supermarkets, a store and a two-storey car park for 140 vehicles. Pedestrians will circulate in an area set below the level of the road, which will be reached by ramped footpaths from bus stops and the car park. Cumberland New Town, between Glasgow and Stirling, is to have a completely "pedestrian town centre" (only in the literal sense, one hopes). In this case it will be built above the road system, with lifts from roads to the shopping deck.

### George Cohen Registers "600"

The figures "600" have now been registered as a trade mark by the George Cohen Group. The Trade Marks office is very cautious about the registration of purely numeral marks. It is true that in the past such numerals as "4711," "57," "555" and "333" have been accepted, but absolutely convincing evidence is required that purchasers of the goods being marketed would associate the actual figures with the trading activities of the concern seeking to register the mark. The origin of the "600" mark is in the fact that, back in 1876, some 42 years after the firm's establishment, the headquarters of George Cohen Sons and Co., Limited, transferred to 600 Commercial Road, London, E.14, where, incidentally, the company still maintains an office block, warehouses and a large wharf. In the early 1920s the figures were first used as a mark on goods and in publicity.

### One-Way Experiment in London

Sponsored by the London traffic management unit, presided over by Dr. G. Charlesworth, a large-scale experiment in one-way working in Central London streets is proposed for early next year. It would include restricting Charing Cross Road and Tottenham Court Road to northbound traffic, extending also up Hampstead Road to its junction with Gower Street. Southbound traffic would be diverted along Gower Street, Bloomsbury Street, Shaftesbury Avenue, Monmouth Street and St. Martins Lane. The distance involved is 1½ miles and the experiment would initially be for a six-month period. Apart from the inevitable and serious inconvenience to bus passengers this scheme has the added weakness that the traffic handling capacities of the two routes are disparate, Monmouth Street and St. Martins Lane in particular being very narrow thoroughfares.

### May Design Own Bus Shelters

Newcastle upon Tyne City Council is considering designing its own bus shelters. Hitherto, the council has bought ready-made shelters from private firms, but according to the City Engineer (Mr. D. T. Bradshaw) they "leave much to be desired."

### Jungfrau Railway Record

On one day this summer, 2,864 excursionists ascended the Jungfrauoch (11,111 ft. above sea level), one of Switzerland's show places. This was a record in the annals of the Jungfrau Railway, the world's most dramatic rail line, since its completion in 1912.

### Road Casualties in July

Accidents on the roads of Great Britain in July, the last month for which reliable statistics are available, caused 634 deaths. This was 46 more than in the same month last year. The increase of nearly 8 per cent may be partly explained by the fact that July included the Saturday and Sunday of the August Bank Holiday weekend, which last year fell in the month of August. Motor traffic (expressed in terms of vehicle mileage) was an estimated 6 per cent heavier than a year ago.

### Further Extension of Pacific Northern

In British Columbia the Highways Minister, Mr. P. A. Gagliardi, has stated that economic studies are being made for the possible extension of the proposed Pacific Northern Railway through the Yukon Territory into Whitehorse and on to the Alaskan city of Fairbanks. He announced this at the first conference of the three governments of Alaska, Yukon and British Columbia. One of the proposals of the Alaskan delegates was for a ferry service from Prince Rupert 450 miles through the Panhandle to Haines, Alaska.

### Work of Co.I.D.

Only a minority of British firms has as yet accepted that a convinced and progressive design policy is a function of good business management, and far too little attention is yet paid to designing for the convenience of the user, says the annual report of the Council of Industrial Design. The Co.I.D. is taking every opportunity to encourage large-scale purchasers of all kinds—including shipping lines, local authorities, nationalised industries and government departments—to give a more positive lead in their choice of equipment.

### Reshuffle of District Line Services

Changing traffic requirements on the London Transport District Line have led to service alterations to be introduced on October 10. The service from Richmond will be substantially improved in the morning peak and so will the Wimbledon service both morning and evening. Edgware Road trains will generally be extended from Putney Bridge to Wimbledon (not stopping at West Brompton, East Putney and Wimbledon Park). The Hounslow branch peak-hour trains, which are lightly loaded, will be fewer. There will be more skip-stop trains in the morning peak. At the Upminster end of the system services will also be improved.

## The commercial vehicle industry has waited years for this—the new Simms filter

Its filtering efficiency is 98% down to particles as small as 2-4 microns

This is the highest efficiency of any commercial fuel filter made anywhere in the world

Particles below 2 microns are too small to be harmful, there is therefore no point in trying to remove them. All larger particles are removed completely, thus eliminating damage to fuel pump and injectors.

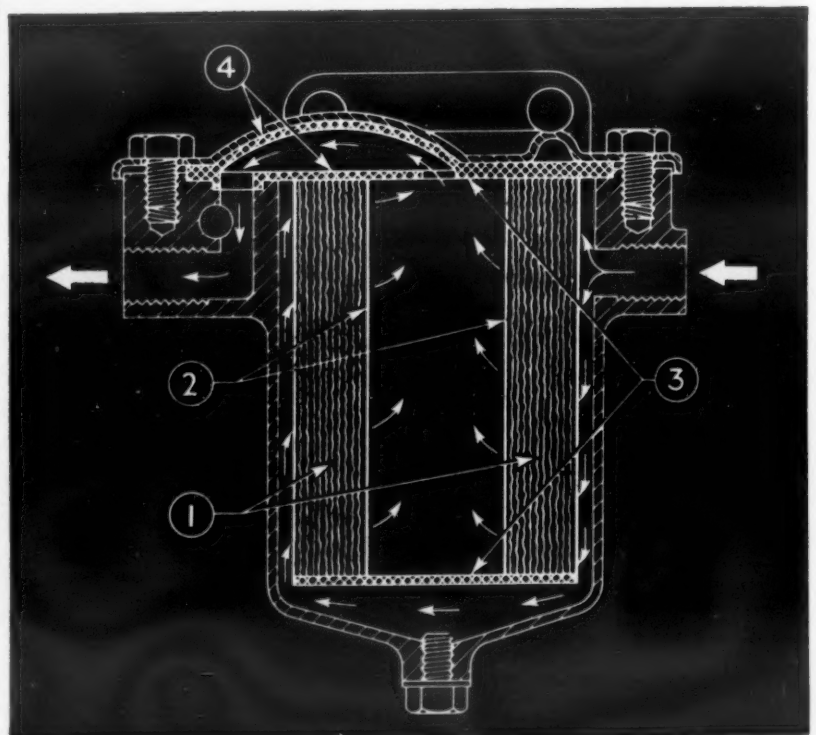


It is the simplest of filters to maintain

### Look at these features:

- 1 Extra Large area, corrugated element giving long life.
- 2 Inward flow: clean side of element always faces inside.
- 3 Moulded ends completely protect all clean surfaces from dust.
- 4 Upper end of filter-element forms all seals. There are no loose bits to cause trouble on assembly.

Replacement of the element is so simple that it can be done by an unskilled operator with complete certainty that the filter will function properly.



# Simms

**Specify it on new engines, fit it to those already in use**

You can get full details from **SIMMS MOTOR UNITS LTD., LONDON, N.2**



## COMMERCIAL AVIATION

### More B.O.A.C. 707 Services

#### QANTAS FREIGHTERS

IT has been announced that Rolls-Royce powered Boeing 707 of the British Overseas Airways Corporation, which are already operating from London to New York, Montreal, Toronto, Detroit and Chicago, are to serve San Francisco from October 20. Two flights weekly will be operated each way between London and San Francisco. On the flights from London the jet journey time for the 6,150 miles will be 14 hr. 50 min., including a stop of 1 hr. 20 min. at New York. The journey from San Francisco to London will take 12 hr. 30 min., including 1 hr. on the ground at New York. The new services will be in addition to a weekly turboprop Britannia flight operating between London and San Francisco. B.O.A.C. Britannias will also continue to operate across the Pacific between San Francisco and Tokyo and Hong Kong twice-weekly.

#### Transpacific Operation

B.O.A.C. has announced that its 707s are to operate the fastest scheduled transpacific air service between San Francisco and Tokyo and Hong Kong when they are introduced on the Corporation's westabout route from London to the Far East on December 8. This follows the conclusion of talks in London by British and Japanese authorities on air services between Britain and Japan to which reference is made on this page. There will be a twice-weekly service of B.O.A.C. 707s in each direction between London and Hong Kong calling at New York, San Francisco, Honolulu and Tokyo. They will replace the present twice-weekly Britannia service on this route. An additional 707 flight each week will operate the transpacific sectors only, between San Francisco and Hong Kong. The new service will also mark the opening of B.O.A.C.'s round-the-world services by pure jet air liner. The 707s will connect at Hong Kong and Tokyo with B.O.A.C. Comet 4s flying eastabout from London to the Far East via Pakistan and India.

#### New Indian Service to Ceylon

The Indian Airline Corporation proposes to extend its Bombay-Belgaum-Cochin service to Colombo as an experiment from November 1. The new flight is expected to call also at Trivandrum and Madurai.

#### C.A.A. Extends Skybus Operation

The Skybus—a special cheap-class service used principally by Africans and operated by Central African Airways—will be extended to Northern Rhodesia from October 6. Single fares from Ndola will be: Fort Rosebery, £2 15s.; Lilongwe, £6 10s.; Fort Jameson, £4 15s.; and Blantyre, £9 10s.

#### New Pluna Service

The Primeras Lineas Uruguayas de Navegacion Aerea recently extended its services to include a twice-weekly flight between Montevideo, Buenos Aires and the Uruguayan cities of Salto and Paysandu. Previously journeys between these cities and Buenos Aires have involved a change at Montevideo.

#### U.A.L. Anniversary Figures

United Air Lines began its second year of jet operations on September 18 with a record of having flown 1,350,000 passengers on jet aircraft in the last 12 months. During the year the fleet, composed of Douglas DC8s and Boeing 720s, flew 1,875,000,000 revenue passenger-miles, which was the equivalent of the company's total traffic in 1951. At present the DC8s and 720s provide more than half the U.A.L. daily capacity.

#### New Qantas Freight Service

Qantas will start a new air freight service between London, Hong Kong and Sydney later this year to cope with the increase in air cargo business. The new service will supplement the present weekly freight flight which operates between London and Sydney via Singapore. It will also be operated weekly, in association with B.O.A.C. Qantas has converted two passenger-carrying Lockheed Super Constellations. During the past 12 months, its cargo business has increased by 38 per cent. In 1958-59 the company made £2 million from air freight business and in 1959-60 this increased to £2,800,000. The London-Singapore-Sydney cargo service was started only last November, but the demand has caused the extra service through Hong Kong to be introduced.

#### U.K.-Japanese Talks

Consultations in London between representatives of the aviation authorities of Japan and the United Kingdom were concluded last week. Such consultations are a normal regular occurrence under the Air Services Agreement between the two governments. The two delegations reviewed the services operated by their respective airlines and their plans for further expansion which included, on the Japanese side, the introduction of services from Tokyo to London both over the Pole and via India and the Middle East. On the British side the plans included the further expansion of B.O.A.C.'s round-the-world services via the Pacific, India and the Middle East. The delegations also reviewed the development of regional air services within East Asia. Full agreement was reached on all matters discussed.

## THORNYCROFT DEMONSTRATIONS

### In London for Fortnight

FROM October 3 to 15 inclusive, the Marston Motor Co., Limited, will be holding a special Thornycroft vehicle sales and service fortnight at its showrooms at Seven Sisters Road, Tottenham. As sole distributor of Thornycroft vehicles in London and the Home Counties north of the Thames, the Marston Motor Company will demonstrate a range of vehicles at full payload. These will include the Trusty PK single-drive eight-wheeler, the MH Mastiff six-wheeler, ML Mastiff four-wheeler, VK tractor and HLJR6 with van body.

When the Earls Court Commercial Motor Show ends, all vehicles from the Thornycroft stand will be transferred to the Marston Motor Company premises. Anyone interested in attending the demonstrations should contact the company (Tel: Stamford Hill 8000). The vehicles will be available for trial and service engineers will be in attendance throughout the show.

## BRITISH RAILWAYS ELECTRIFICATION CONFERENCE



Message from Mr. S. B. WARDER, M.I.Mech.E.,  
M.I.E.E., Chief Electrical Engineer  
British Transport Commission

• • • • •

● Modern Transport has always given prominence to reporting matters relating to railway electrification. Appropriately, therefore, the Editor is an official delegate to this conference, and the columns of Modern Transport will, in due course, report the proceedings with its usual penetrative skill.

● The conference was thought to be necessary as a result of the decision taken by the British Transport Commission in 1955 to adopt the single phase a.c. system at national frequency, instead of the formerly approved 1,500-volt d.c. system, for all lines where it could be financially justified, other than on the Southern Region. No case at present exists for infiltrating the a.c. system into a successfully operating and extensive third rail d.c. network.

● The ensuing five years have seen the British Transport Commission and regional engineers—in conjunction with the manufacturing industries—designing, manufacturing, testing and putting to work the prototype equipment for the two pilot schemes on which the equipment was to be proved, and much more besides.

● It was felt that at some point of time, sooner rather than later, an account should be given to the railway technical world of all that had been done so far in this new field.

● It was further considered that only by a conference of the kind now organised in conjunction with the manufacturing organisations concerned, could the subject be adequately covered.

● In order that as complete a picture as possible could be given, no fewer than 43 papers have been prepared for discussion, and it is already apparent that a great deal more will be left to say when further operating experience has been accumulated during the next two or three years, or when the great Manchester-Liverpool-Euston scheme is completed.

● The exhibition, like the conference, is the first of its kind in the history of British Railways, and will display a wealth of new developed equipment—not only of today, but of tomorrow as well.

● This is only the beginning of a new success story, for the modernisation plan has provided a unique opportunity to introduce on the grand scale those new developments, not previously available, and all concerned may be justly proud of this achievement.

*S B W arder*

## P.V.O.A. DINNER

### Freeing Traffic

#### COACH OPERATORS' PROBLEMS

MINISTER and operators in amiable accord seemed to be the keynote of the Passenger Vehicle Operators dinner held in London on Monday with Mr. Arthur Bolton, chairman of the P.V.O.A. National Council, presiding and supported by over 400 members and their guests. In welcoming the guests, Mr. Bolton paid tribute to the secretary of the association, Mr. F. A. Walker, and especially to his prowess in writing letters. He gave a special welcome to Mr. Ernest Marples, Minister of Transport, and said the P.V.O.A. could not be other than pleased with his modern outlook on clearways, by-passes and motorways. They, however, would like to draw his attention to their problems concerned with the private operation of minibuses, limitations on box dimensions on vehicles, the need for a release from the speed limit, or an uplift in restriction, and of course the need to press the Chancellor in respect of the half-crown fuel tax. "I ask you for your full co-operation in altering these things to our satisfaction and to the benefit of the travelling public," he concluded.

In his reply, Mr. Ernest Marples said it was necessary to divide road traffic problems into two parts—firstly into those concerned with towns and then the interurban aspects. By the mid-1960s, there would be in this country a network of motorways and trunk roads. Their construction was comparatively easy, but the second part of the problem was how to deal with the urban areas. What would you do when you got there? It was no good trying to plan urban motorways without a scientific survey of origins and destinations. They now had this in progress for the first time in London, and they were only just doing it because of the number of separate authorities hitherto concerned with highways. They now had unified control under the Ministry of Transport. Secondly it was necessary to remember that flyover or underpass arrangements were difficult and thirdly that whatever was done one had to keep the existing traffic moving. He could say that there would be twice the cash for urban road projects in the next five years compared with last year. Local authorities could budget five years ahead, which gave them a chance to plan.

#### Maximum Benefit

It was most important to get the maximum benefit from existing streets so as to do the best for the greatest number and stop the selfish motorists from obstructing others. The United States was in advance of us in achieving lane discipline. Parking spaces could only be allocated to the temporary parker. The long-term parker must get off the street. As to the more distant future, roads could not be isolated from the planning of buildings. If one did, one had a conurbation like Los Angeles which was 20 suburbs in search of a city. There the only way to solve the traffic problem now was by spending \$600 million on a public transport system. He would do his best on the problems raised by Mr. Bolton and especially in respect of rural buses. The Minister concluded by saying that coach operators' vehicles had been tested for years—why should not private cars be tested also, even if, as said in some quarters, the number of accidents thereby avoided was selectively small. We had to take every possible measure to reduce the carnage on the roads.

## ELECTRIFICATION EXHIBITION

(Continued from page 3)

Cubicle and industrial switchboards, busbar trunking and cable trunking are the specialities of Ottermill Switchgear, Limited, shown on stand 24. A. Reyrolle and Co., Limited, show on stand 19 an air blast circuit breaker for 25 kV and a 1,200-amp. 25-kV 250-MVA single-phase small-oil-volume circuit breaker for use in trackside substations controlling the supply to the overhead. South Wales Switchgear, Limited, has on view (stand 35) 6.25 kV air-visitulated metal-enclosed switchgear and a two panel fuse switchboard.

The main exhibit on the Hackbridge and Hewitt stand (22) is a 6.25 kV railway isolator, consisting of two single-pole units, one of which is operated by a motor-operated mechanism and the other by hand.

On stand 33 is single-phase switchgear for feeder station and track sectioning cabin substations by Switchgear and Cowans, Limited, as employed on the Manchester-Crewe, Crewe-Liverpool and Glasgow suburban schemes and on stand 27 Switchgear and Equipment, Limited, shows isolators.

#### Remote Control Gear

Standard Telephones and Cables, Limited, on stand 21 presents remote control equipment similar to that used on the Eastern Region. A mosaic diagram of the type exhibited, but 42 ft. long is incorporated in the Romford control room. Circuit breakers and other switches are controlled from, and their condition shown on, this mimic diagram. The company is also exhibiting a modern signalling control desk incorporating train descriptors. The control panel is constructed of unit mosaic tiles and shows a typical track layout for a comparatively small interlocking area, with all the controls and indications following a geographic pattern. Telecommunications cables and STRAD, an electronic retransmission system, are also displayed, as are small-diameter coaxial cable telephone systems and S.T.C. capacitors. The pantograph selected for B.R. locomotives and coaches is the Stone-Faiveley and this is featured by J. Stone and Co. (Deptford), Limited, on stand 16.

The Westinghouse signalling exhibit on stand 37 is a model railway layout along which runs a Bo-Bo 25-kV a.c. locomotive, the passage of which operates four-aspect colour-light signals in their correct sequence. A number of a.c.-immune relays in both standard and miniature plug-in ranges will be shown, as well as the equipment for a single rail d.c. track circuit and double rail 75 c/s track circuit using a static frequency convertor. The brake exhibit shows some of the more important components of the electro-pneumatic brake equipment supplied for British Railways a.c. multiple-unit stock and components for the vacuum-controlled straight air equipment for locomotives. The rectifier exhibit comprises a two-circuit equipment type 1285 for British Railways a.c. multiple-unit to provide 8-kW at 200 volts d.c. for a Westinghouse type C.M.38 motor-driven air compressor and a constant potential 8-kW 110 volts for battery charging, train lighting, etc.



## Equipment and Accessories at Earls Court

(Continued from page 5)

strong and pleasing design—a valuable asset. Adjoining stands of **Brown Brothers, Limited** (150), and **Thomson and Brown Brothers, Limited** (149), feature a very wide range of service and maintenance equipment. In addition there are a range of space heaters, specialised components and I.C.I. Belco and Dulux finishes for which these exhibitors are sole distributors. Examples of Capex friction pads fitted to a Lockheed transmission disc brake and to a Girling disc brake assembly are together with Capasco brake linings and clutch facings displayed on stand 263 of **Cape Asbestos Co., Limited**. The stand of **Castrol, Limited** (159), has a wide range of Lubrequipment, hose reel units and the floating grease pump for the transfer of

ing rings at the top and bottom of the canister make it oil tight. Among new C.A.V. electrical equipment are new 8-in. and 7-in. diameter alternators and there is also a transistorised regulator for use with the latter.

Spark plug on the stand of the **Champion Sparking Plug Co., Limited** (196), all have an attached gasket that cannot drop off and have special zinc plating with silver finish to protect exposed metal surfaces from rust. The **A. W. Chapman, Limited**, stand (283) shows four types of seats for public service and commercial vehicle drivers and also the range of fixed and adjustable coach passenger seats. This is the first show at which **Chloride Batteries, Limited** (stand 345), has

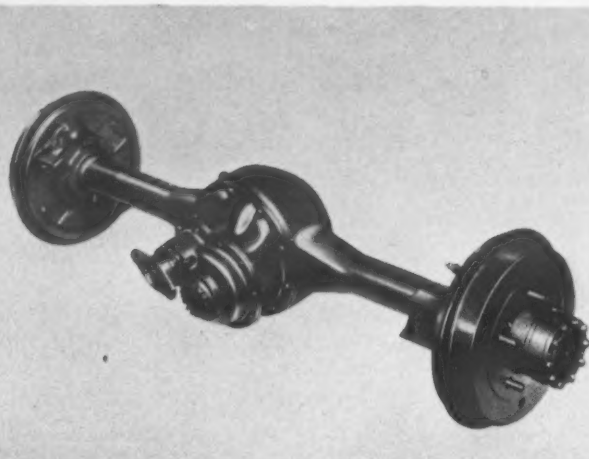
is laid upon the Chromo-Rings which were first shown last year at the Motor Show and thus make their first Commercial Show appearance.

The complete redesign by the **Dunedin Engineering Co., Limited** (stand 171) of its Injectester has resulted in the Mark II weighing only 5 lb. as compared with the 11 lb. of the Mark I. A complete test on a four-cylinder pump now takes only 15 min. The Diestester has also been redesigned as a result of user experience and collaboration with engine manufacturers. Two new dual-purpose tyres of the **Dunlop Rubber Co., Limited** (stand 192) are the RK8 with a very deep pattern and thick tread and the RK9 which differs in that it is basically a three-rib instead of a bar design. It is expected that

The Pyrene PD10 fire extinguisher which is charged with 10 lb. of dry chemical



new product is a double-reduction axle for heavy-duty applications embodying fully floating axle-shafts. The opportunity afforded by this change to improve the mounting of the bevel pinion by introducing a pilot bearing has been taken.



New fuel oil filter produced by Simms Motor Units which has no springs or seals to replace when changing the paper element; the K-L Motorairrette ventilator for vans; the E.N.V. double reduction 5,000 lb. capacity axle

lithium-based and other non-self-levelling greases direct from factory-filled containers.

Developments displayed by **C.A.V., Limited** (stand 231) include sectioned models of the turbo-charger which is now available in three basic sizes covering a range of engines between 50 and 400 b.h.p. Fitted to something over 70 of the engines at the show the two versions of the DPA fuel-injection pumps serve as a reminder that more than 400,000 are already in service. The turbocharger may also be seen, of course, in the new Foden Mark 3 two-stroke dumper. The F type paper element fuel oil filter has been joined by the FS type. This dispenses with the bowl housing the filter element. A disposable canister containing the paper element is clamped between a cast aluminium filter head, which incorporates all fuel connections and the mounting bracket, and a cast aluminium base. The clamping is done by a centre stud between the filter head and the base and synthetic rubber seal-

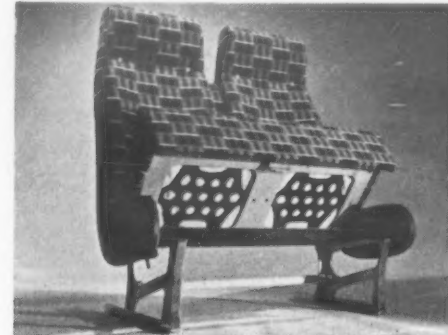
displayed its Exide Auto-fil battery for light commercial vehicles normally fitted with 12-volt seven- or nine-plate car-type batteries. This simplifies greatly the process of topping-up the batteries.

### Heating and Ventilating

Designed specially for Bedford vehicles new vacuum-hydraulic and air pressure-hydraulic servos are shown by the **Clayton Dewandre Co., Limited** (stand 417) and another main display is of the new combined coach heating, ventilating and engine cooling system which has recently been introduced. The A350 exhaustor has been added to the range of units to provide a high-speed vacuum pump of simplified design and a large show is made of the Air Pak—SC4 air compressor system for medium-sized goods and passenger vehicles, with the alternative vacuum system comprising Hydrovac and rotary exhaustor. Main emphasis on the **Cords Piston Ring Co., Limited**, stand (327)

these will, in a limited range of popular sizes, replace the long-established Roadtrak Major. Three types of disc brake, including one specially designed for earthmovers, are on the stand (317) of the associated **Dunlop Rim and Wheel Co., Limited**. The brake for the earthmover is of open design and does not allow water and mud to collect in the friction surfaces. It is fitted with heavy-duty sintered iron friction pads. A new design of master cylinder has the relief duct orifice placed where it is exposed only when there is back pressure in the brake system. It follows that the piston is allowed to move in a completely smooth bore during normal operation, with a great improvement in seal life and efficiency.

Under an arrangement with the **Eaton Manufacturing Company, the E.N.V. Engineering Co., Limited** (stand 335), is now offering the Trac-Aide controlled slip differential which can be applied to cars and to light commercial vehicles. Another



The Vitafoam resilient seating platform installed in the Plaxton coach seat

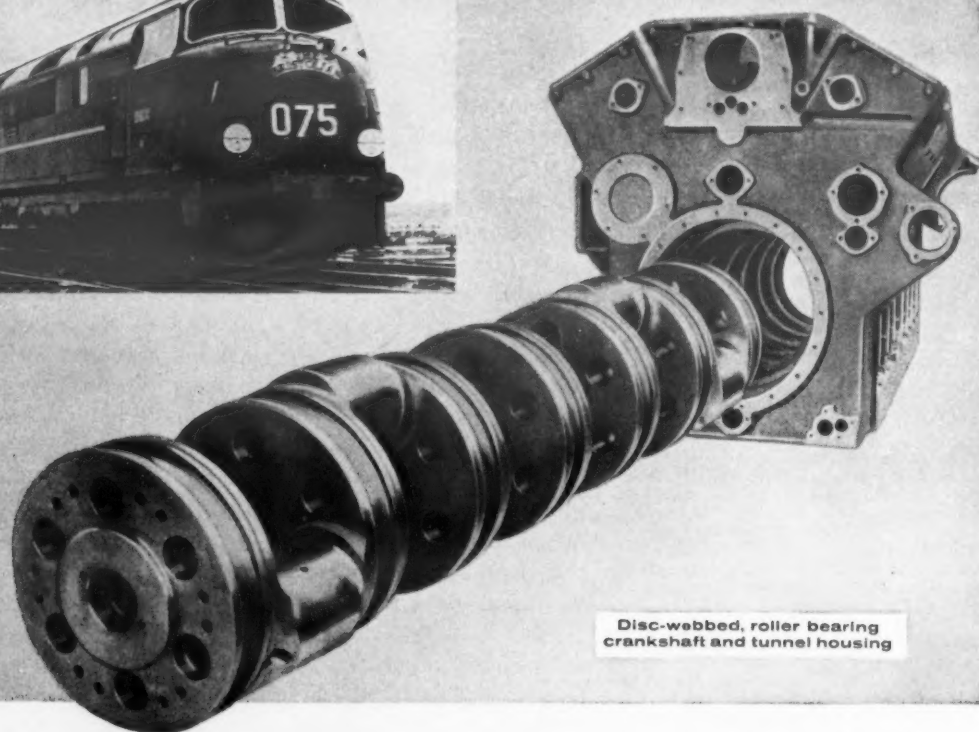
Responsible for a wide range of transport supplies, **Equipment and Engineering Co., Limited** (stand 412), this year makes a particular feature of the Frankmann Lubrimatic automatic sump oil dispenser for which it has taken over the sole sales agency. There are also Simplex jacks, a film of the Februat bus washers and a version of the Eco Routemaster multiple route number indicator gear operating four digits with a handle and selector.

### New Belt

Since the last Commercial Motor Show, **Ferodo, Limited**, has introduced two new products which appear on stand 274. One is the AM series of moulded brake linings and the other is the Poly-V belt. This is essentially a flat belt with a series of parallel vee-shaped grooves moulded on its inner side. Where dual and triple drives are at present used for fan, water pump and generator drives these can now be replaced by a single belt and pulley system. Five examples of its tyres including the Super Mileage Lug for rear wheels of vehicles which spend much of their time doing off-the-road work are shown by the **Firestone Tyre and Rubber Co., Limited** (stand 185), together with bonded rubber-to-metal parts and bellows for the Airide air sus-

(Continued on page 20)

Maybach rail traction  
diesel engines—  
from 400 to 2,000 hp  
can achieve  
16,000 hours between  
major overhauls...



Disc-webbed, roller bearing crankshaft and tunnel housing

## ... ANOTHER ENGINEERING ADVANCE FROM BRISTOL SIDDELEY

**Bristol Siddeley Engines Limited** produce Maybach\* rail traction diesel engines. Covering a power range from 400 to 2,000 hp, these diesels are amazingly reliable and have shown that they can achieve major overhaul lives of 12,000 to 16,000 hours!

The proven basic design features of the whole range (straight 4 to 16-cylinder V) are the same, and each unit can be turbo-charged, or turbo-charged and intercooled. The range operates up to 1,600 rpm and combines the best performance and design qualities of high, medium and low-speed diesel engines: light weight and compactness; excellent thermal efficiency; and extremely long life.

### Advanced design features

The pistons are pressure-oil cooled. This gives very efficient heat dissipation and reduces liner and gas ring wear to a minimum. The roller bearing, disc-webbed

crankshaft is exceptionally rigid within its tunnel housing, and in practice withdrawal is not normally necessary before 12,000 hours running. So low is big end bearing wear that in some cases the protective lead flash has been found to be intact when examined after 15,000 hours running!

Since the cylinder bore and stroke, and the majority of components, are identical in all models, spares stocks are considerably reduced. Servicing also has been greatly simplified because much thought has been given to accessibility and the removal of components. And the engines are suitable for both hydraulic and electric transmission.

**World-wide application.** Maybach rail traction diesel engines are in service all over the world and have built up an unsurpassed record for reliable and economic operation. Bristol Siddeley Maybach diesels power the new diesel hydraulic locomotives of British Railways Western Region and over 200 engines have already been ordered by British Railways alone.

For further information please write to: Maybach Sales Manager, Bristol Siddeley Engines Limited, PO Box 17, Coventry, England.

\*Under licence from Maybach-Motorenbau GmbH

**BS BRISTOL SIDDELEY ENGINES LIMITED**



# MANCHESTER—CREWE ELECTRIFICATION

## London Midland Region Procedure\*



**F**OLLOWING closely on the civil engineer's progress the signal engineer proceeded with his task of replanning and modernising signalling and telecommunications facilities. Semaphore signals have been replaced by modern colour-light signals, carefully spaced to provide an even headway throughout; the controls are arranged to give the maximum degree of automatic working. Control of the greater part of the Manchester—Crewe section has been concentrated in three new power signalboxes covering respectively eight, 12 and 15 route-miles of line and enabling 29 old boxes to be abolished with savings of staff and greater operational efficiency.

### Work of Signal Engineer

Running lines have been track circuited throughout, mechanical points converted to power operation, block working replaced by train describers and the automatic system of train control installed

special drum wagons, erect the insulators and fittings and run the catenary and contact wires

### Current Supply

The 25,000-volt single phase a.c. current is supplied to the overhead equipment from the Central Electricity Generating Board substation via railway-owned cables and feeder stations. Sectioning of the overhead equipment is made possible by track sectioning cabins at suitable locations and all circuit breakers and the majority of switches associated with power supply are remotely controlled from an electric control room which has been built at Crewe. A carefully planned routine enables the construction and installation of switchgear in these cabins to be carried out in the minimum time. There are two feeder stations for the Crewe to Manchester stage, one at Heaton Norris and one at Crewe. In the event of a failure in the supply from one feeder station, it is



Sir Brian Robertson, chairman of the British Transport Commission, introducing Mr. Ernest Marples, Minister of Transport, at the opening ceremony of the Manchester—Crewe electrification on the concourse at Piccadilly; right, Mr. Ernest Marples dispatches an electric train from No. 5 platform

on all lines. The new signalling will result in an all-round speeding up of the working with better regulation, improved flexibility and greater safety and reliability. Provision for the B.R. automatic warning system to assist drivers has been made.

Existing power signalboxes north and south of Crewe Station have been retained; the three new boxes are at Sandbach, Wilmslow and Piccadilly (the former London Road). The new boxes work through thumb switches mounted on a console in front of an illuminated track diagram on which is shown the identification number and exact location of all trains in the section controlled by the box. The new box at Piccadilly controls an area from Oxford Road Station to Heaton Chapel on the Stockport line; to Gatley on the Styal line; and to Ashbury on the Sheffield line. This area was formerly controlled by 13 signalboxes having a total complement of 848 levers. Today about half that number of small switches do the work electro-pneumatically. Other work carried out by the signal engineer included the modernisation of telecommunications facilities throughout the area and the provision of specially screened telecommunications cables in ground level troughing to replace the familiar telegraph wire and pole system. Some

possible to extend the feeding limits of the other feeder station by switching operations decided upon in the control room.

The construction depot which has been built at Crewe has been designed as the main material store for the northern half of the Euston—Manchester—Liverpool electrification scheme. From here material can be despatched to strategically sited sub-construction depots, such as East Didsbury on the Crewe to Manchester line, where the works train vehicles were stabled and replenished. There is a large building accommodating stores and workshops, a compound for drums of cable and wire, and a considerable stacking area, served by sidings, for the storage of steelwork.

### Depots

District electric depots have been provided at Crewe and Longsight. In the depots, rolling stock will undergo short-term examination and the maintenance of overhead equipment will also be centred here. The depot at Crewe, which has been built adjacent to the construction depot, incorporates the electric control room for the control of the electrified lines between Crewe and



The 12.15 p.m. West of England express leaving Manchester Piccadilly with locomotive No. E3040 carrying the special opening ceremony headboard to mark the inauguration of the service on September 12

notes on the procedure on the London Midland Region electrification, the next stage of which is Crewe—Liverpool, and which will eventually cover the lines between the Mersey and London, follow.

### Erection of Equipment

When the chief civil engineer has carried out the necessary permanent way and station alterations, and has completed any other work associated with electrification, such as the raising of over-bridges, and the signal engineer has removed obstructions such as aerial routes, signals, etc., work can proceed on the erection of overhead equipment. In view of the necessity for carrying out the maximum amount of work in the smallest possible possession times on main lines with a high traffic density, this has to be a highly mechanised operation.

A fleet of 100 vehicles is made up into various works trains, each of which is used for a particular class of work in connection with traction equipment. First an auger borer unit enters the particular section of track being dealt with, and bores a succession of holes for supporting structure foundations. This is followed by a steel train which, by crane, lifts a mast from stock carried by the train and plants it in the hole. Lastly, a train consisting of the continuous concrete mixing unit concretes the mast into position. Later, other works trains consisting of flat topped vehicles and

Manchester and also associated lines when they are electrified. The main locomotive works at Crewe is being reorganised to provide repair facilities for the electric stock associated with the scheme. This will be based on a unit replacement system, to ensure the vehicle is out of traffic only for the minimum time. Also, 20 Type A electric locomotives of the standard Bo-Bo type have been ordered from Crewe works. These 79-ton units will have A.E.I. electrical equipment and one will be on view at Battersea. Another batch of 20 will be built at Doncaster.

Other locomotive types, all of 3,000 to 3,300 h.p. continuous rated power, comprise 25 by A.E.I. (Rugby) and Birmingham Railway Carriage and Wagon Co., Limited, 10 by English Electric and Vulcan Foundry, 10 by A.E.I. and Beyer Peacock and 10 by General Electric and North British Locomotive Company. Multiple-unit trains for the Manchester—Crewe electrification were built at Wolverton by British Railways and incorporate germanium rectifiers in their B.T.H. electrical equipment. With the Liverpool—Crewe trains, 42 four-car sets are needed.

Mr. J. Raymond, chairman and managing director of Stone-Chance, Limited, a member firm of Stone-Platt Industries, is now in the United States where, inter alia, he will visit some of the larger American manufacturers of telecommunications equipment concerning matters of interest to Austinlite, Limited, subsidiary of Stone-Chance.

\* First portion appeared September 17.

# B.T.C. ELECTRIFICATION

MANCHESTER—CREWE  
LIVERPOOL—CREWE  
GLASGOW SUBURBAN



Using Single Phase Switchgear Type K11 330 MVA at 27.5kV and Type B.41 165 MVA at 6.9kV.

27.5kV and 6.9kV single phase metalclad oil filled Switchgear for the Feeder Station and Track Sectioning Cabin Sub-Stations controlling and protecting the incoming supplies and feeders to the overhead conductors.

The equipments are of unit construction and are readily extensible to form multi-panel switchboards.

One of the K11 switchboards supplied to the B.T.C. Midland Region.



**SWITCHGEAR & COWANS LTD.**  
MANCHESTER

## "RIVET" YOUR ATTENTION

on these pertinent answers to your fastening problems. They tell you of the many advantages to be gained by using 'Pop' rivets for every form of assembly.

## TUCKER 'POP' RIVETS

### Q What is a 'Pop' rivet?

A It is a tubular rivet assembled on a headed steel mandrel.

### Q In what sizes and materials are 'Pop' rivets supplied?

A From 1/8" to 1/2" dia., in aluminium alloy, mild steel and monel for riveting up to 1/2" thickness.

### Q What is the operating principle?

A By means of hand or pneumatic tools the mandrel is drawn through the rivet, forming a head on the blind side and at the same time clenching the sheets together. When the joint is tight the mandrel breaks leaving the rivet head fully formed.

### Q What are the advantages of the 'Pop' rivet?

A Only one side of the structure to be riveted need be accessible, only one operator required, ease and speed in setting, combination of lightness with strength, foolproof and gradual setting action which eliminates any possibility of damage or distortion of the structure.

### Q How do 'Pop' rivets cut costs?

A They can be set at speeds in excess of 20 per minute by one unskilled operator. They facilitate riveting in hitherto unknown inaccessible positions, thereby reducing design costs.



**Geo. TUCKER EYELET Co. Ltd.**  
Walsall Rd., BIRMINGHAM 22B

Telephone: BIRchfields 4811 (9 lines)

Telegrams: EYELETS, BIRMINGHAM

The trade mark "POP" is registered in respect of rivets in the United Kingdom and many other countries in the name of the Geo. Tucker Eyelet Co. Ltd.



EUROPEAN ELECTRIFICATION  
(Continued from page 13)

electrification with a.c. and d.c. are represented by those of Austria and Belgium. Dealing first with Austria and its a.c. main-line system, this started in 1905 with the electrification of a local mountain railway. The electrification of the main Alpine lines with their long tunnels was studied but rejected by the military authorities as too "vulnerable" in case of war. However, the 1914-18 war left Austria small and without coal resources and by 1922 it was decided to start on the electrification

MAIN PARTICULARS OF S.N.C.F. BB. 16500 LOCOMOTIVES

	Passenger gear	Freight gear
Horsepower (continuous rating)	2,500	3,500
at 82 km.p.h.	111	18 st.
at 48 km.p.h.	191	321
Corresponding tractive effort	111	18 st.
Maximum tractive effort	191	321
Maximum speed	140 km.p.h.	85 km.p.h.
Weight of electrical part	281	
Weight of mechanical part	381	
Total weight	661	
Length over buffers	14,400 mm.	

(with 15,000 volt single phase a.c. at 16½ cycles) firstly of the Arlberg line and later all lines west of Salzburg. Current used was produced in railway-owned water power stations.

The early locomotives were heavy pieces of machinery designed by steam locomotive men who simply replaced the boiler by an electric motor; the

Just prior to 1939 motor coach traffic began to make its mark and provided cheap and frequent services. The German annexation and the war left the Austrian Railways again in a very bad state and it was decided to complete the electrification of the main lines, abandon steam and use diesels for shunting and on branch lines, together with other major reconstruction work, which for example included the complete rebuilding of all main stations in Vienna and the construction of an express ring railway round the town. Most of the older motive power was brought up to date and a large number of all-adhesion B-B and C-C locomotives ordered together with motor coaches.

Modern Austrian Locomotive

One of the latest locomotive types is the series 1010 C-C all-adhesion locomotive, of 5,400 h.p. (1 hr.) with low level pivot bogies. The body of the locomotive rests on the two three-axle bogies by means of laminated springs via swing bolsters and swing links. The body itself forms a bridge which carries all traction gear. The most interesting part is the bogie which consists of a hollow beam structure suitably welded together. The traction motors are rigidly built into the bogie. Both the transmission of the traction forces from bogie to the body and the support of the latter by the bogie take place by way of a swing bolster. An alternative design has pivot-less bogies.

The electrical part consists of two current collectors, a compressed-air high speed switch;

S.I.F.A. pedals which must be operated by the driver every 30-60 seconds. If he omits to do so, a warning signal is given and high-speed braking effected.

Main particulars are as follows:

Maximum tractive effort	28,000 kg.
Gear ratio	1:3.185
Maximum speed	130 km.p.h.
Length over buffers	17,860 mm.
Bogie wheelbase	2,650 mm.
Total wheelbase	8,600 mm.
Driving wheel diameter	1,300 mm.
Weight: Working order	109.8 tons
Electrical part	47 tons
Mechanical part	62.8 tons

Belgium

Leaving Austria, we shall now examine the Belgian position as one of a typical 3,000 volt d.c. electrification scheme. Electrification started with the Brussels—Antwerp line 45 km. long. The voltage was chosen because it was expected to have lower running costs than 1,500 volt d.c. Motor-coach trains are extensively employed, consisting of two motor coaches and two trailers. They were designed for maximum speed of 120 km.p.h. and with a gross weight of 274 tonnes offer sitting and standing room for 413 passengers. Further equipment was acquired in 1939 and in that year it was decided to electrify some of the Belgian main lines, but the war interrupted all activities and in 1945 the whole question was reconsidered and it was decided to electrify all main lines, in all 1,500 km. of lines, totalling 3,800 km. of track; to operate this system, 31 substations were to be built and there were to be 370 locomotives and 235 twin motor coach sets. High-speed motor coaches were studied and four locomotive types developed, all of the Bo-Bo wheel arrangement.

We tabulate particulars of one of these locomotives, of series 122, of which 50 were ordered.

Total length	18,000 mm.
Total wheelbase	12,050 mm.
Total weight	82 tons
Wheel diameter	1,262 mm.
Output (1 hr.)	2,560 h.p.
Gear ratio	1:3.125
Maximum speed	125 km.p.h.

The locomotives were built by a group of Belgian

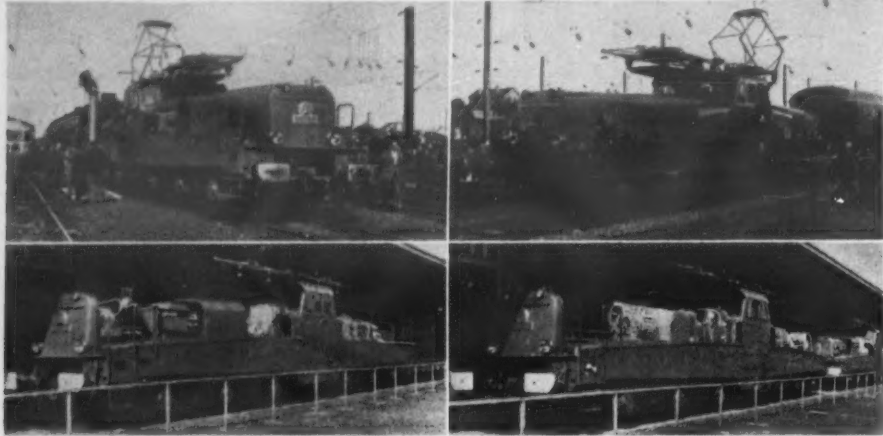
firms. A further series, 123, comprises 83 units, mainly for the Brussels—Arlon line with heavy gradients of up to 1 in 60. For the first six recuperative braking was to be introduced in Belgium to make use of long downhill gradients.

Switzerland

The most remarkable development in Swiss electric railway working is a class of 66 locomotives now being delivered or ordered, the series Ae 6/6 with the Co-Co wheel arrangement. Starting with 2-4-4-2 and 2-6-6-2 locomotives of 2,040 and 2,460 h.p. (1 hr. ratings) the Gotthard line, the main route of Switzerland with its gradients (1 in 38.5) curves and tunnels, needed continually heavier locomotives to avoid double and treble-heading. In 1932 to 1939 three giant locomotives with eight driving and six running axles were put into service, one of them having an output of 8,800 h.p. and weighing 242 tons. But they were rather limited in use (for heavy freight only) and in 1945 a further design appeared, which split the big locomotives in half (2-8-2). Even there required often double-heading to cope with heavy loads and in 1949, a most successful design appeared.

It was the first all-adhesion locomotive for high-speed work to be developed. Its one-hour rating of 6,000 h.p. (1,000 h.p. per axle!) required careful investigation. The locomotive, which weighs 117 tons, is required to haul 588 trailing tons up the steepest gradient; maximum speed is 78 m.p.h. A number of new design features were introduced, some of which have been accepted in other countries, for example high voltage control which simplifies the whole control gear considerably. The motor power is transmitted by Brown-Boveri spring drive. The body is a stress-free self-supporting structure which carries the buffing gear. The bogie frame carries the traction motors and transmission gear and the bogie itself is an ingenious mechanical design to ensure smooth running at high speeds. Other main particulars are:

Overall length	60 ft. 7 in.
Total wheelbase	42 ft. 5 in.
Driving wheel diameter	4 ft. 2½ in.
1 hr. Output	6,000 h.p.
Corresponding tractive effort	46,640 lb. at 74 km.p.h.



On the S.N.C.F. North-East 50-cycle electrification, CC locomotive 14152 with motor generators to produce direct current at Avesnes; BB12001 with ignitrons feeding direct current motors at Liart; below, CC 14113 on inspection at Lille, and right CC 14002 in which three-phase current is supplied to the motors

mechanical and electrical engineers had not yet learned to work together. From the first rod-driven 2-6-6-2 one came within 10 years to an individually-axle driven 2-8-2 in which, however, the motors were vertical, mounted to the body frame. They drove the axles via a complicated link and gear system. After almost 30 years these locomotives are still in use. Between the two wars, the electrification slowly expanded, especially as in time of heavy unemployment it provided a welcome boost to the economy of the country.

voltage control is effected by the Brown Boveri h.t. control which proved so satisfactory on the Swiss Ae 6/6 for the Gotthard line. The high voltage step switch has 28 positions. The transformer consists of a regulating transformer and the main transformer with 28 tapings and 3 auxiliary tapings. The main motors are 10-pole commutator motors. Power to the wheels is transmitted by Brown-Boveri spring drive. There are the usual auxiliaries, including ventilating and compressor equipment. The locomotives are equipped with



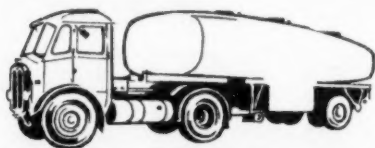
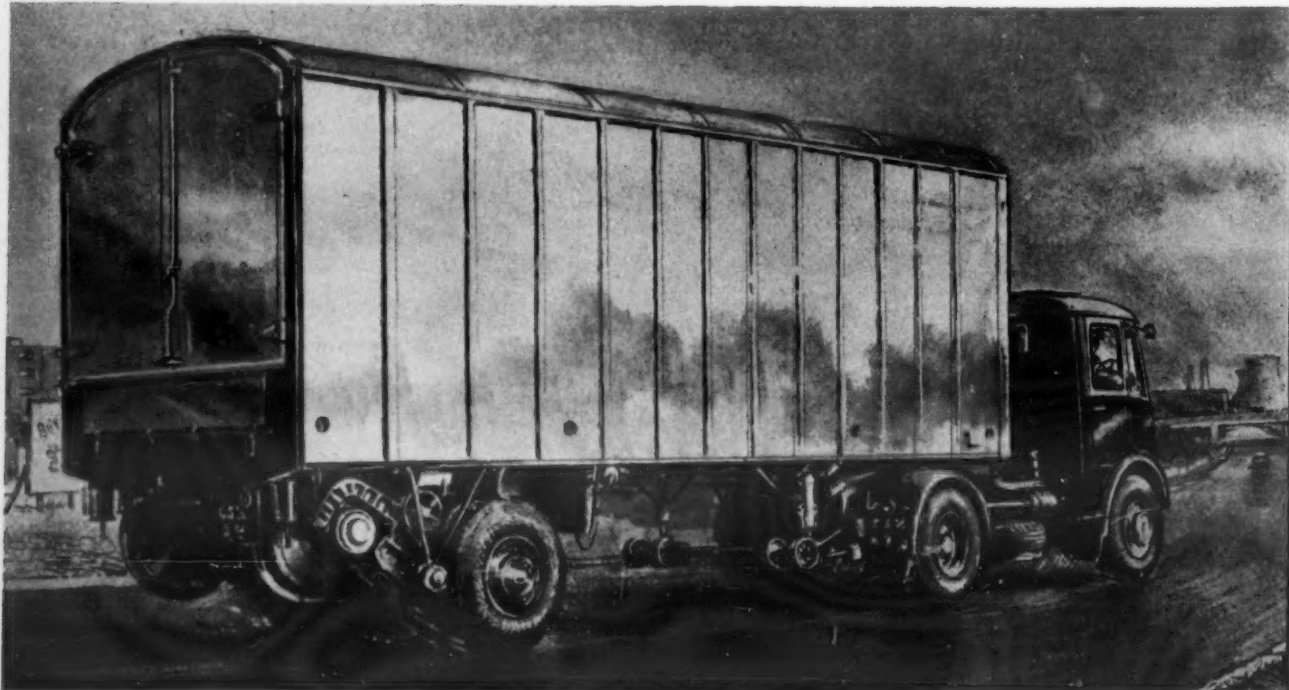
The S.N.C.F. medal marking the Paris-Lille section of its North-East electrification scheme



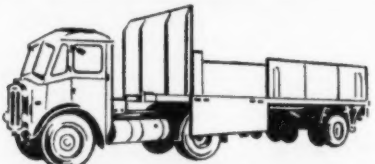
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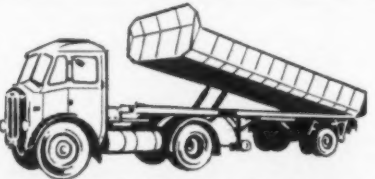
The Roadrailer has combined the advantages of the railway's cheapness and speed for the long hauls; and you can run your freight straight into the unloading bays of its destination without the inconvenience and expense of intermediate handling. This makes possible—and profitable—an overnight service to any part of the country.



A Roadrailer Tanker



A Roadrailer Flat Truck



A Roadrailer Tipper Truck

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## LOCOMOTIVES AND ROLLING STOCK FOR OVERSEAS

*Building, Inspection, Servicing*

By **DERRICK BROWN, C.B.E.**, Chief Mechanical Engineer, Crown Agents for Oversea Governments and Administrations\*

BRITAIN has always been noted for the design, manufacture and export of locomotives and rolling stock and long held a paramount position in that field. Even in 1911, however, this branch of industry was suffering strong competition from the Continent. Since that date not only has competition become keener and far more widely spread, but moreover, the demand has contracted. Nations which were once large buyers of locomotives and rolling stock are themselves becoming manufacturers and even exporters. Apart from shunting locomotives, British Railways was late in dieselising and this, too, has had its effect on export, as manufacturers have been denied some of the opportunities enjoyed by their rivals whose products were strengthened by the demands and service experience of the home railways.

Rig testing and trial running are essential and rewarding but they are no substitute for the grueling test of day-to-day running under actual service conditions. Oversea railways took early advantage of the possibilities of dieselisation and in consequence much of the development work with the

tensive competition from a wide range of suppliers but some of them may be of a markedly lower standard of experience and achievement than the others. If, therefore, the best offer, as distinct from merely the cheapest price, is to form the basis of acceptance, considerable professional skill is required in the writing of the specification, in the technical assessment of offers and subsequently, in the supervision of manufacture.

### Delivery a Key Factor

Delivery is often a key factor. Some overseas administrations are particularly sensitive on this aspect of an offer and this may result in a higher tender being accepted on the basis of short delivery. Assessment on these lines would, however, be meaningless without some redress for failure to keep the delivery quoted, and so we are led into the field of liquidated damages for delay and other contractual and legal matters which are outside the scope of this address.

There are, however, two further aspects which are strictly technical, namely, supervision of

### RAILWAY PARTICULARS

Railway	Gauge ft. in.	Mileage		Max. Speed m.p.h.	Max. Axle Load tons	Loading Gauge		Type of Brake	Type of Coupler
		Route	Track			Max. Height ft. in.	Max. Width ft. in.		
British Guiana	4 8½	60	—	30	10	13 6	10 6	Vacuum	Side buffers and screw couplings
	3 6	18	—	20	10	11 6	9 6	Vacuum	Side buffers and screw couplings
Ceylon	5 6	811	1,057	50	16	13 6	10 8	Vacuum	Being converted from side buffers and screw couplings to A.A.R. knuckle couplers
	2 6	87	102	20	8.5	10 8	8 0	—	Centre buffer and screw couplings
Cyrenaica	3 1½ (95 cm.)	108	—	40	11.2	13 5½	9 10	—	Centre buffer and screw couplings
East Africa	Metre	3,398	4,003	45	21	13 0	10 0	Vacuum (Tanga) Air (Kenya)	M.C.A. centre coupling
Ghana	3 6	591	750	35	13.5	12 8	9 6	Vacuum	A.A.R. knuckle coupler
Jamaica	4 8½	208	246	50	16	15 0	10 3	Air	A.A.R. knuckle coupler
Kowloon-Canton (British section)	4 8½	22	35	45	18	15 6	10 2	Air	A.A.R. knuckle coupler
Malaya	Metre	1,028	1,300	50	16	12 9	9 3	Vacuum	M.C.A. centre coupling
Mauritius	4 8½	82	118	25	18	14 9	9 10	Vacuum	Side buffers and screw couplings
Nigeria	3 6	1,780	2,239	40	16.5	13 0	10 2	Vacuum	A.B.C. centre coupling
North Borneo	Metre	116	124	25	12	12 9	9 6	Vacuum	A.A.R. knuckle coupler
Sierra Leone	2 6	311	339	20	5	11 0	7 9	Vacuum	West Africa centre buffer and screw coupling
Trinidad	4 8½	109	157	35	11.5	14 1	13 3	No through power brake	Centre buffer link and pin type

new types of locomotive had to be done on site. Such development, thousands of miles from the maker's works, is difficult and very expensive but has had the notable result that such locomotives have from their inception been designed with a view to meeting the special and exacting requirements of overseas service. Some of this experience has been fed back into types running on British Railways which in turn are now providing service experience based on a much greater running mileage than could be attempted by any except the largest of overseas railway administrations. This will be of immense advantage to all of those in this country whose interests lie with overseas railways.

### Modernisation Experience

Within the last year there has been a growing appreciation of the need for making more widely available the national asset inherent in experience gained under the British Railways modernisation plan. It is, however, important to realise and allow for the differences between the needs and conditions of the railway system of a highly industrialised country such as Britain and those which rule on many of the railways overseas where the remoteness of outlying sheds brings its own problems of supervision and control and where the advantages of air travel in providing specialist help and essential spares can only be obtained at very high cost and are thus of limited application.

Trouble does not arise merely in the development of locomotives of new design but also in new features on even well-established locomotive types. In the first stages of a complaint there is often a genuine need for more detailed information, but the effect of a questionnaire provided by the "back room boys" on an overseas supervisor, harassed by the day-to-day business of running a railway, is not always appreciated. In cases of real difficulty there is often no substitute for a personal visit, which, though costly, usually has advantages in the establishment of personal relations and the building up of background information which extend far beyond its primary purpose.

### Buying Policy

The problem of export commences at the stage of calling for tenders. Changes of political status have not unnaturally affected buying policy. Independence whether achieved or anticipated has brought an increased determination to be tied to no particular country but to tap all sources of supply and accept the offer which proves most favourable. Some of the aspects of tendering procedure are purely contractual and outside the purview of this institution but many of the details of tendering are in fact linked closely with the professional responsibility of the engineer. There are two main methods of calling for tenders, by invitation and by advertisement.

Each has its advantages and disadvantages. Invited tenders are normally restricted to firms known as reputable suppliers but this procedure of tendering by invitation does not necessarily tap all possible sources of supply. Hence, to ensure coverage of the whole field and to save the possibility of embarrassment due to subsequent suggestions that a better bargain might have been obtained some administrations prefer to advertise their inquiries so that all firms interested may have an opportunity of tendering. In the case of the more attractive inquiries, this usually involves in-

design, and inspection during manufacture. Engineering inspection does not form a part of my responsibilities as, at the Crown Agents, it is dealt with by a separate department, that of the Chief Inspecting Engineer. During the course of my career, however, I have served in that department, and would like to include a few remarks on this aspect of the manufacturing procedure.

### Inspection

Inspection is a term which can cover anything from examination by an unqualified examiner to comprehensive inspection by a qualified professional inspecting engineer. It is the latter type of inspection to which I refer. For a steam locomotive, the main contractor may place 200 or more sub-orders for parts which he does not manufacture himself, and for a diesel locomotive there may be over 400. All of these have to be dealt with in the course of inspection which, wherever practicable, should be carried out at the works of the actual manufacturer. The skill in inspection arises not in accepting what is manifestly right or rejecting what is obviously wrong, but in those borderline cases where a man is called upon to decide and discriminate.

His decisions, even when unpopular in the works, must command respect and acceptance and this is a mark of the essential character of a good inspector. A good works does not normally object to a strict inspector. What they do object to is the inspector who cannot make up his mind. The man who knows what he wants and sees that he gets it is a safeguard not only to his overseas principal, but also to the manufacturer. His watchful insistence helps to keep workmanship and finish tuned to the high standard required for the export market and he often picks up defects or omissions which might otherwise have involved the manufacturer in costly complaints.

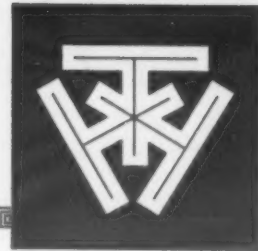
### Delay

Finally, whilst on this subject, I would like to say a word about an expression which is sometimes used, namely "delay due to inspection." There are, of course, cases where there is delay due to the inspector not being immediately available but the case to which I refer is when inspection itself is regarded as the cause of delay. If inspection is one of the provisions of a contract, it must be accepted as an essential part of the production process, and the time taken in carrying it out efficiently can no more be regarded as "delay due to inspection" than the time taken in preparing the design can be regarded as "delay due to the drawing office."

The supply of spare parts is always a matter of concern. There is an increasing pressure on controllers of stores to keep down the amount of capital tied up in stores holdings. In the case of one overseas railway for which the Crown Agents act the value of stores and fuel at December 31, 1958, was £3.78 million and was reduced in one year to £3.13 million. Whilst this was partly the result of "good housekeeping"—including examination of every stock card every month—it is also a reflection of the improved delivery which is, of course, a key factor in assessing stores requirements. Long deliveries, and even more important, uncertain deliveries, can prove a worrying and costly feature of operation on an overseas railway remote from main sources of supply. Recently there has from time to time been delay in the delivery of some items of spares for steam loco-

(Continued on page 25)

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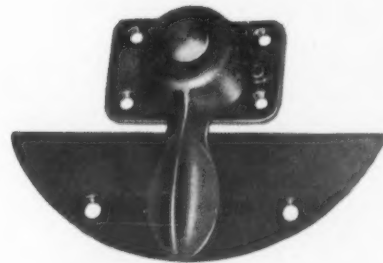
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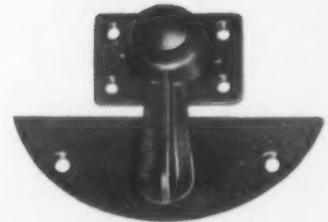
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\* Excerpt from presidential address to the Institution of Locomotive Engineers.



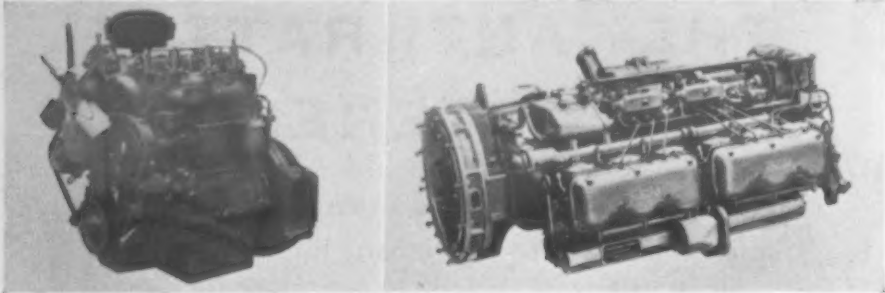
## Equipment and Accessories at Earls Court

(Continued from page 16)

pension system. Another tyre stand is that of **Fisk Tyres, Limited (193)**, a member of the Kenning Group, which exhibits the Airborne and Air-Flight models for vans and light lorries, the Transportation for heavier commercials and the Tuf-Lug for heavy work.

**Forgings and Presswork, Limited**, a Birfield

with ranges of conventional and disc brakes and dampers. New exhibits to the show of **Goodyear Tyre and Rubber Co., Limited (stand 188)**, are the Super Road Lug for on- and off-the-road service, the Unisteel, which actually appeared about a year ago and is of the belted type of construction, and the low-loader tyres with sidewall scuff bands.



Small and large diesels: Perkins Four 203 and, right, Gardner 6HLX

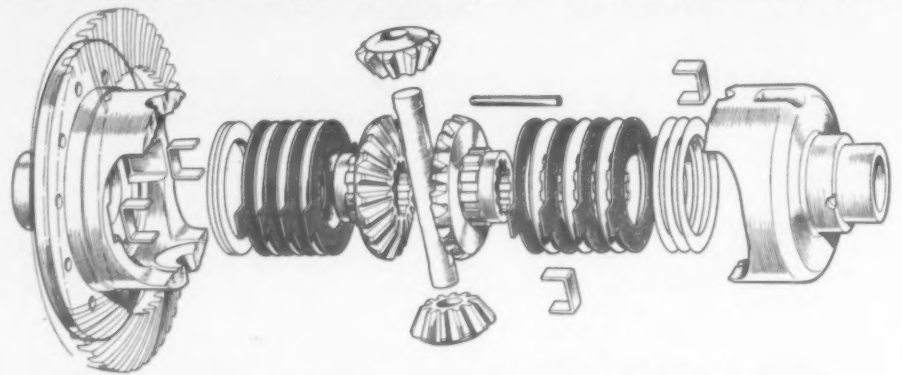
Group company, has on stand 365 a wide range of drop, press and upset forgings, some of them as forged and others in heat-treated condition. There is also a display of the cold extrusions in steel which are being increasingly used by vehicle manufacturers. As indicated in MODERN TRANSPORT of September 24, **Norris, Henty and Gardners, Limited (stand 416)**, is showing for the first time at Earls Court its 6HLX horizontal underfloor engine together with its longer-known 4LK, 4LW, 5LW, 6LW, 6HLW and 6LX units. Features of the new unit were outlined in our previous issue. A central rig with cutaway sections of a **Girling** brake installation for a 7-ton vehicle is on stand 294 together

These bands can, if desired, embody a depth indicator to show the rate of wear.

### Sliding-Door Gear

Making its debut is the Widney Panther sliding-door gear on the stand of **Hallam, Sleight and Cheston, Limited (320)**. The action comprises two special plastics rollers running in contact and bearing on upper and lower surfaces of track channel. Requiring no maintenance or lubrication and designed for quantity production the gear can be adapted to any length for commercial vehicles, coaches and railway rolling stock. Among other exhibits is the Corlite five-way driver's seat which

provides vertical and two independent horizontal slide adjustments as well as a tilting cushion and seat back. A Birfield Group company, **Hardy Spicer, Limited (stand 368)**, shows a variety of propeller shafts and universal joints including the reversed sleeve type of assembly with fixed or permanent joints at each end. In this design the sliding movement is catered for by a long reverse



Cutaway view of Trac-Aide differential produced in Britain by E.N.V. Engineering

sleeve yoke fitted to the shaft. Another exhibit is the Birfield (formerly Rzeppa) constant-velocity universal joint designed primarily for front driving axles with independent wheel suspension and fitted in the new Austin 7 and Morris Mini-vans. Three tyres by **Henley's Tyre and Rubber Co., Limited (stand 184)**, include the Maxi-Miler with a wide flat-ribbed tread in an improved compound for maximum wear and the Trek Track, a tough all-purpose lorry tyre with triple centre riding ribs and rugged angled buttresses. The exhibits of **Hepworth and Grandage, Limited (stand 272)**, comprise, inter alia, ring carrier pistons which will be available in quantity early next year for all well-known diesel engines, Vacran rings treated by the Cargraph process and spheroidal graphite rim castings which are now in quantity production.

Three new tyres introduced by the **India Tyre and Rubber Co., Limited**, are on stand 182. One, the Super G25, is for all road transport require-

ments, while the Super G26 has been developed for all on- and off-the-road conditions and is particularly suitable for vehicles on civil engineering contracts and the like. The third new tyre is suitable for light lorries and is introduced in one size only, namely 6.50 by 16. This is the first Commercial Motor Show at which the **Kelly Springfield Tyre Co., Limited**, has exhibited (stand 189) and

examples shown include the Super Armor Trac for high mileage, the Dual Trac for on- and off-the-road work and the Tractor Rib for driving wheels. Half a score of new products as well as the latest versions of some of its well-tried ones are on stand 371 of **Key-Leather Co., Limited**. They include the Motorairette ventilator which is a smaller version of the Motorair unit intended for smaller commercial vehicles and vans. In another sphere of equipment is the new K-L pliable safety grub handle, while the Norway cab heater has been redesigned to provide adjustable demister ports.

### Damping Body Boom

The Laycock-Haussermann clutch, which is to be manufactured in a range of sizes to cover most vehicle applications, is shown for the first time by **Laycock Engineering, Limited**, on stand 367. The construction is centred round a diaphragm spring which ensures that there is no reduction in torque throughout the normal life of the driven plate. The T.R. transmission coupling also makes its debut on this stand. It is intended to eliminate, or at least reduce considerably, body boom. Consisting of two cup-shaped members between which is a compressed rubber ring placed approximately centrally over the universal joint pivot axis so that it transmits pure torque. The coupling is fitted as an ancillary to an orthodox Hardy Spicer propeller shaft, subject to provision being made in the design stage for the clearance required. The garage equipment division has a separate stand (169) and on it is the Optiline making it possible to check optically all aspects of wheel and steering alignment. The adjoining stands of **Joseph Lucas (Electrical)**,



Widney Corlite five-way driver's seat

Limited, and **Joseph Lucas, Limited (233 and 232)**, display a considerable number of additions to electrical and lighting equipment. Among them are the new all-glass Sealed Beam headlamp light unit, the four headlamp system, the 2AC alternator and its accompanying 2TR control box which have been developed to meet the requirements of those vehicles having electrical loadings greater than can be balanced adequately by conventional d.c. generators of reasonable dimensions and weight, and the new L617 flashing direction indicator.

With long experience abroad in supplying the police and other public services with aural and visual warning equipment, **Marchal Distributors, Limited (stand 282)**, is making a special feature thereof this year. The latest sizes of its X tyres shown by the **Michelin Tyre Co., Limited (stand 190)**, are the 8.25 by 17 and the 7.00 by 16, while there is also a 9.00 by 20 renewed by the Rebuildex process. The shows always afford the **Motor Industry Research Association** an opportunity to illustrate some of the work which it is carrying out and the items this year (stand 10) are the effect of exhaust and other noises upon people not riding in vehicles, the design of axleshafts, disc-brake squeal and high-altitude simulation. Two new Nubresc Tite-Seal grease guns for commercial vehicles are shown by **Ch. J. Neuman, Limited (stand 357)**, one of them being a multi-loading model which can be charged in four ways. Cutaway models as well as complete batteries figure on stand 352 of **Oldham and Son, Limited**. Among them are the Pg bus batteries and the standard and high-performance lightweight Power units. Editorial reference was made in our last issue to the direct-injection Six 354 engine of **F. Perkins, Limited (stand 419)**. That manufacturer displays its new Four 203 now available in automotive form as well as more than half a dozen others in its wide range of power units. **Pirelli, Limited**, has seven tyres on stand 183 including the Carriload and Atlantic which it exhibited for the first time at the 1958 show.

An exhibitor at every Commercial Motor Show which has been held in London, **Pritchett and Gold and E.P.S. Co., Limited**, has on stand 228 a comprehensive selection of Dagenite batteries, including the Shednought series assembled in Monobloc containers. Recent months have seen the introduction of several pieces of fire-fighting equipment

(Continued on page 26)



Thames 15 cwt. Van

## ... all trades agree

All trades and traders agree, you can count on Thames in all manner of ways. Count on their busy briskness to do credit to your name... count on their vigour to come back for more... count on their care if your goods are fragile. More, Thames suit all trades because of their low prices; their low-cost where-you-want-it service; their economical running. Suit drivers too—with car-comfortable cabs, car-type controls and draught-proof doors. If you'd like to count on Thames, count on your Ford Dealer to tell you how—and how much better off you'd be!

# THAMES VANS BY FORD

BRITAIN'S BEST SELLERS—THAMES VANS AND TRUCKS



# REJUVENATION OF FRENCH RAILWAYS

## Electrification as Basis of Higher Productivity

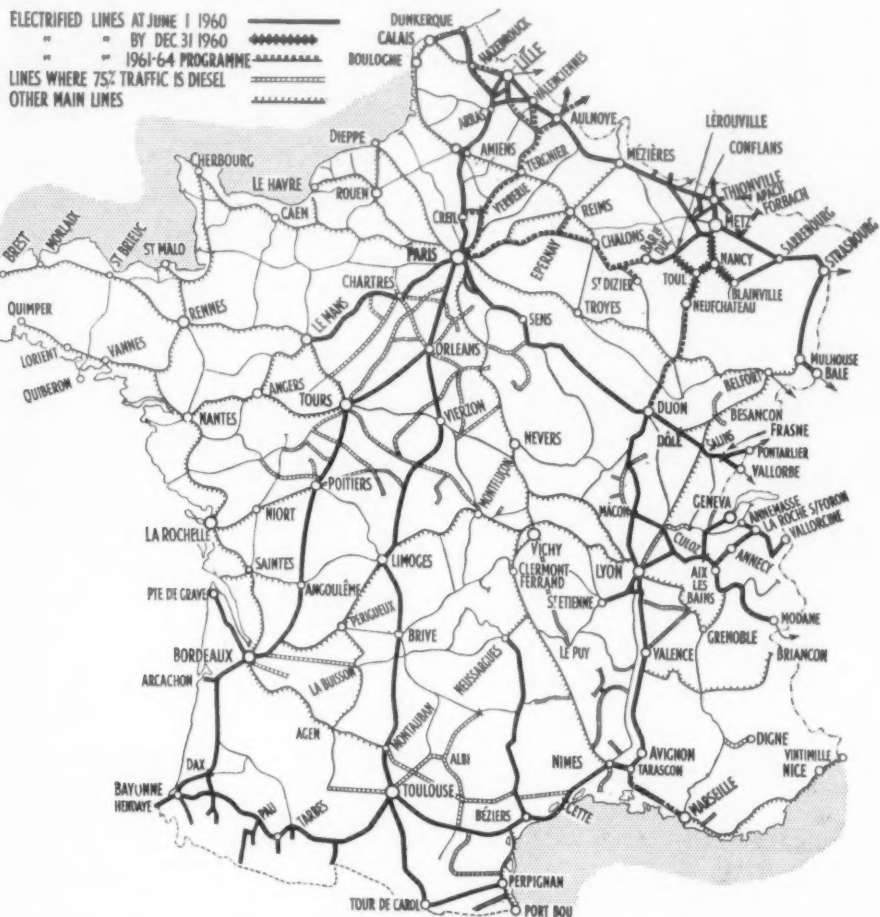
NOW that the regeneration of the French National Railways is well advanced, it is of particular interest to examine some of the results as an indication of what may reasonably be expected from the modernisation of British Railways. The turn of the tide, so far as the French railway system is concerned, dates from the formation of the S.N.C.F., which became effective on January 1, 1938. At that time traffic was in a state of decline due to three principal factors; the unsatisfactory condition of the French economy, the vast amount of unremunerative route mileage that was worked, and the repercussions of the 40-hour week. Compared with British railways, the French operated 30 per cent

been the fundamental objective of the S.N.C.F. and it forms the basic policy to which the whole scheme of modernisation is geared. Longest-established pre-S.N.C.F. major main-line electrification was that operated by the Paris—Orleans and Midi companies over some 1,550 route miles, principally between Paris and the Spanish frontier. This essay established beyond any doubt that the tremendous potentialities of electric traction were ideally suited to French conditions.

### Electrification Results

Not only was there a saving of 400 tons of coal per kilometre, representing a return of 7 per cent per annum on the capital outlay, but also the

ELECTRIFIED LINES AT JUNE 1 1960  
" " BY DEC 31 1960  
" " 1961-64 PROGRAMME  
LINES WHERE 75% TRAFFIC IS DIESEL  
OTHER MAIN LINES



French railways, showing electrification schemes completed and in hand during the next quinquennium

more route mileage and handled some 20 per cent less traffic. Productivity was poor and much of the rolling stock was antiquated and inefficient.

### Effective Pruning

Although integration on a regional basis was effective from the start, the war and its aftermath severely handicapped further progress on a planned basis. Nevertheless, the policy of rationalisation that had been implemented in 1938-39 gave good results, so that by 1946 7,637 route miles had been closed to passenger traffic and the number of prime movers reduced from 19,400 to 16,824. At the same time in terms of passenger-miles and ton-miles, traffic had increased by 35.5 and 28 per cent respectively. This improvement to a level

lighter maintenance made possible a big reduction in personnel—at a time when the 40-hour week had boosted labour costs to an unprecedented level. As a result of its substantial electrified mileage, the P.O.-Midi system had the best operating ratio in France, and its early success had a decisive influence on the subsequent policy of the S.N.C.F.

Apart from the unorthodox third rail section of the P.L.M. between Culoz and Modane, the only other section of main line to be electrified prior to 1938 was between Paris and Le Mans, converted by the Etat in 1937. In common with the P.O.-Midi system this line was electrified at 1,500 volts d.c., which is standard for all lines south of Paris with the exception of the sections



New wine in old bottles: Paris—Lyon electric locomotives in the old steam roundhouse at Mouche

that equalled the best year between the wars was in great measure due to the rapid rehabilitation of the railway system at a time when other forms of transport were still hors de combat. It is a profound testimony to the real efficiency of the S.N.C.F. that it has been able to retain the initiative throughout a subsequently more difficult period when political unrest and the phenomenal growth of road transport have presented serious difficulties.

Today, the successful outcome of the unremitting effort that has gone into the modernisation of the S.N.C.F. since 1938 may be gauged by the fact that in 1959 passenger and goods traffic had increased (in terms of passenger-miles and ton-miles) by 44.8 and 102 per cent respectively, whilst the route mileage of the system has been pruned by 20 per cent and the total number of operatives reduced from 514,000 to 359,000. Similarly there has been a tremendous reduction in rolling stock and locomotives.

The electrification of its main routes has always

Aix-les-Bains—La Roche-sur-Foron, Annemasse—La Roche—St. Gervais les Bains and the Dôle to Vallorbe and Les Verrières sections which use the industrial frequency a.c. current.

### Postwar Progress

The nature of the period 1938-48 was not conducive to electrification, but as soon as the work of reconstruction permitted the tremendous scheme for the conversion of the old P.L.M. main line was begun. The first section from Laroche to Dijon was completed on December 15, 1949, that between Paris and Laroche on August 29, 1950, and eventually the line throughout to Lyon on June 24, 1952. On this single section the estimated saving in operating costs was £6½ million per annum.

Of even greater moment at this time was the work being carried to a successful conclusion on the experimentally worked Aix-les-Bains—La Roche-sur-Foron section with 20,000-volt (after-

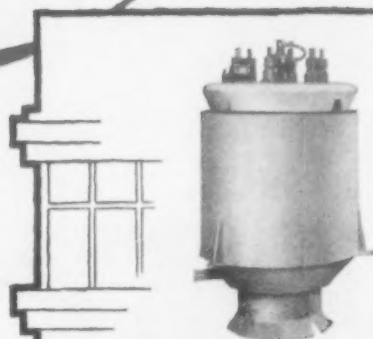
(Continued on page 22)

## RECTIFIERS for railway service

There's a wealth of experience and 'know how' behind AEI rectifier equipment for railway electrification. Three-quarters of a million kilowatts of AEI rectifiers are in service or on order for traction service in all parts of the world. This total includes 200,000 kW of semiconductor rectifiers ordered by the B.T.C. for British Railways' new 25 kV a.c. locos and motor coaches. AEI supplied the first British-built mercury-arc rectifier substation equipment to be commissioned in Britain, and were also responsible for the development of the first semiconductor rectifiers for traction duty.



... on wheels  
AEI COACH-MOUNTED RECTIFIERS  
A Semiconductor Rectifier designed for under coach mounting on an a.c. traction system.



at the trackside . . .

AEI SUBSTATION EQUIPMENT  
Above: A six-anode pumpless steel tank rectifier for d.c. traction service. Below: Mercury-Arc Rectifier substation.



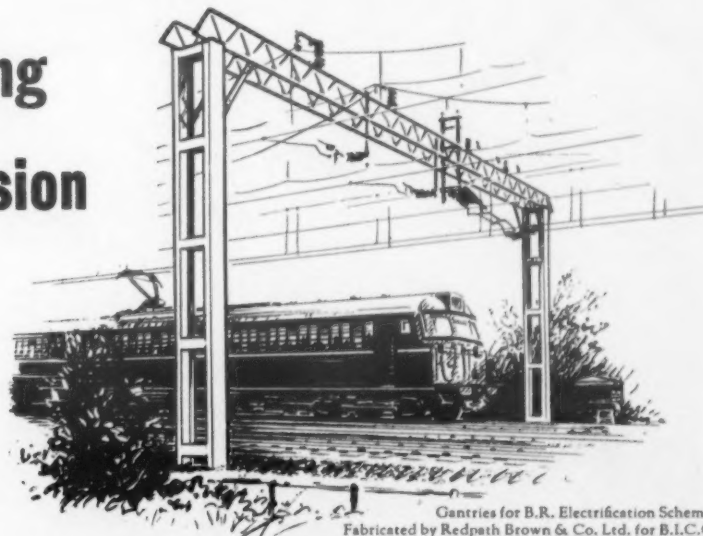
AEI Traction Rectification Equipment includes  
● SIX-ANODE PUMPLESS STEEL TANK  
● MERCURY-ARC RECTIFIERS  
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Associated Electrical Industries Limited  
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ASB 6

## Fighting Corrosion



Gantries for B.R. Electrification Scheme. Fabricated by Redpath Brown & Co. Ltd. for B.I.C.C.

on the B.R. electrification scheme, with

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## French Railway Rejuvenation

(Continued from page 21)

wards 25,000-volt) a.c. industrial frequency current. Since then this system has been widely adopted, and the S.N.C.F. has used it exclusively for the lines in the north-east area. By successive steps it is now in use on the following sections: Valenciennes—Thionville (June, 1955), Valenciennes—Lille (December, 1955), Thionville—Metz—Strasbourg (1956), Strasbourg—Basel (1957), Valenciennes—Lens (1957), Paris—Amiens—Lille (December, 1958). Other lines forming part of this scheme and included in the current programme will be dealt with separately.

Before reverting to the subsequent development of the 1,500-volt d.c. lines farther south it is convenient to mention here the line between Dijon and Vallorbe which was electrified in 1957. Between Dijon and Dôle it is 1,500 volts d.c., but the sections Dôle—Frasne—Pontarlier and Frasne—

electrification of the Est main line between Paris and Sarrebourg—a distance of 432 km. A number of other lines in the area is being dealt with at the same time. The Lerouville—Metz (65 km.) line is now completed and gives the shortest direct route between Metz and Paris, forming a direct link with Luxembourg and Bonn via Thionville. In the same area, Nancy to Metz and Metz to Conflans via Pagny-sur-Moselle will complete the electrified network in the Metz district.

The Toul—Dijon line is at present being electrified to Neufchâteau (43.1 km.) and is scheduled to come into operation this year. It forms the principal connecting link between Lorraine and the Rhone valley. The section Neufchâteau—Dijon is scheduled for electrification within the next four years. Epernay—Reims (30.5 km.) and Blesme—St. Dizier (17.2 km.) are also scheduled

and the section Pont à Vendin to Haubourdin on the line Lens—Lille were completed in 1959. The second stage of this programme dealing with lines on which electrification will be commenced in 1960 includes the line from Creil to Aulnoye and the line from Paris to Verberie. These will be followed by the line from Aulnoye to the Belgian frontier; from Fouquereuil to Dunkerque and Lille to Hazebrouck.

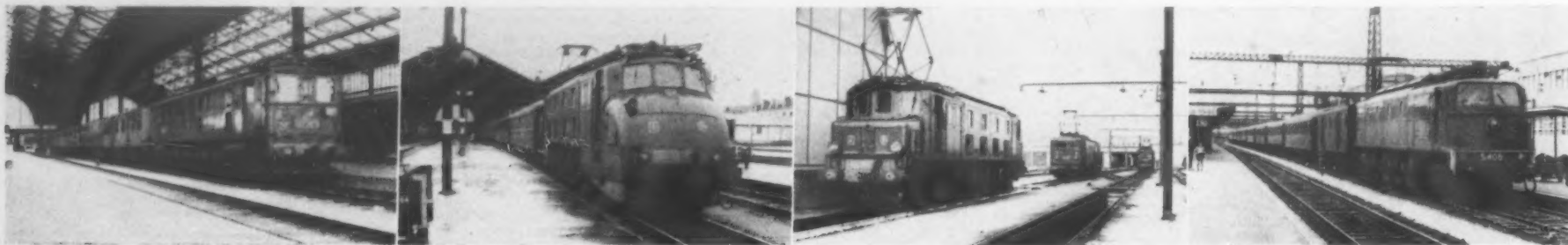
### Utilisation

By the latter half of 1961, when the S.N.C.F. has completed its third equipment and modernisation plan, the system will have 4,900 route miles of electrified track, which amounts to 20 per cent of the entire network, and will account for 70 per cent of the total traffic. At the end of 1959 the electrified network was 4,090 route miles, about 16.8 per cent of the total, and responsible for 53 per cent of the traffic. The number of electric locomotives in service was 1,439 and in addition there were 476 multiple-unit sets. On this basis the entire system could be worked with rather less than 4,000 prime movers as opposed to roughly 12,000 if the system were worked by steam.

### Statistics Improved

It is only possible here to touch upon some aspects of the French modernisation that are making a big contribution to overall efficiency. Fewer and bigger trains is one aspect; average tonnage of freight trains since 1946 has increased from 715 to 873, parcels trains from 350 to 482 and passenger (locomotive-hauled) trains from 360 to 410 tons. The number of tons-kilometres produced by each wagon in a year has risen from 96,100 in 1948 to 159,700 in 1959. Although freight traffic has increased by 100 per cent since 1938 the number of wagons in use has decreased by 33 per cent. This has been done by making possible a higher utilisation of the wagons in service and by increasing the average load, which now exceeds 15 tons.

Finally, it should be emphasised that this remarkable progress would not have been possible



Various types of S.N.C.F. 2D2 electric locomotives. Left to right, local train at Tours; Paris-bound express at the same station; St. Pierre des Corps electric locomotive depot; and a Paris express about to leave Le Mans

Vallorbe are 25,000 volt a.c. single-phase industrial frequency, and between Pontarlier and Les Verrières 15,000 volts a.c. single-phase at 16½ cycles to meet Swiss requirements.

### Through Trains to Italy

After the electrification of the Paris—Lyons section was completed in 1952 the line to Ambérieu and Culoz was dealt with in the following year, and from Ambérieu to Mâcon in 1955. With the section up to Modane already electrified, this enabled through electric working between Paris and Rome via Mâcon, Culoz, Modane, Turin and Genoa. Finally the line between Culoz and Geneva was completed in 1956, thus completing the main routes in this area.

The next extensions of 1,500-volt d.c. traction were south from Lyon on the branch to St. Etienne and from Givors to Chasse on the main line. From Chasse the electrification of the main line was taken south to Loriol in 1958, reaching Avignon in 1959 and Nîmes in 1960. This completes the current programme in the south except for the final section of the main line between Tarascon and Marseille where the work is now well advanced.

At present the main emphasis on electrification in France is in the north-east, and has as its main purpose the completion of the triangle Paris—Lille, Lille—Strasbourg, Strasbourg—Paris, by the

within the next four years, the former giving direct access to Paris and also forming a link whereby the heavy traffic from the north can be taken via Chalons sur Marne to St. Dizier en route to Dijon and the south.

### Closing Steam Depots

By the end of this year the work on the main line between Bar le Duc and Sarrebourg will be complete. By 1961 it will reach Chalons sur Marne, and the final section between Chalons sur Marne and Paris will be ready by 1962. The existing steam depots at Metz-Frescaty, Nancy-Heillecourt, Conflans, Toul and Vitry le François will be closed. The depot at Blainville will be adapted for both steam and electric working, and the depots at Strasbourg and Paris-La Villette converted to electric traction, with workshops at the latter depot.

It is estimated that in all some 143 electric locomotives will replace 358 steam engines and effect a saving of 600,000 tons of coal per annum. The locomotives will be of two types already in service on the north-east routes, 27 of the BB16000 class, and 116 of the lighter BB16500 class.

### Nord Electrification

After the electrification of the main line from Paris to Lille via Creil and Arras in 1958, various branches, including part of the Grand Ceinture

Since 1946 the daily mileage run by an electric locomotive has improved by 42 per cent, and it is not uncommon for a locomotive to cover 37,000 miles in a month. Since 1938 the total consumption of energy for traction purposes has declined by 37 per cent although the work done is estimated by the S.N.C.F. to have increased by 75.5 per cent. The actual total of train miles worked shows a slight decrease.

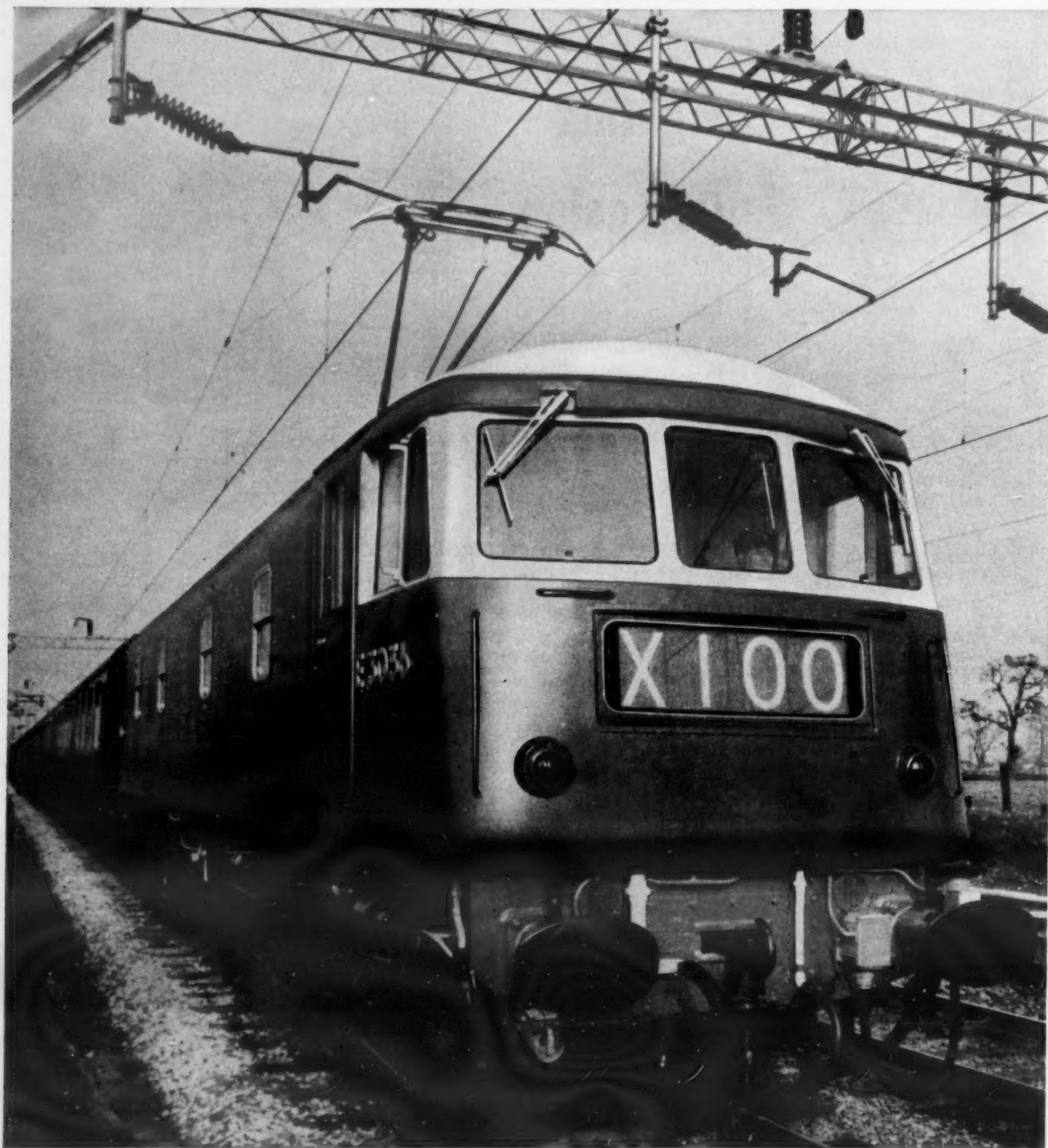
### Role of the Diesel

These striking economies are by no means entirely due to electrification. Diesellisation, and to a lesser extent, improved efficiency with steam working have made an important contribution. Altogether there were 2,380 diesel units in service in 1959, and about one-half of these were railcars, the remainder being mainly shunters. In terms of traffic handled the diesel contribution is a relatively small one, but this is understandable when it is remembered that it is the policy of the S.N.C.F. to relegate diesel traction to the more unremunerative lines where traffic is light in relation to the mileage covered.

In comparing the improved utility of the three modes of traction since the war it is clear that in spite of higher maintenance costs steam is by far the least productive. On a basis of daily mileage for all units in service the figures show that between 1946 and 1959 electric locomotives

without the full co-operation of a well-trained and diligent personnel. Railwaymen in France are a distinct fraternity, and for the average cheminot the S.N.C.F. is as much a way of life as a form of employment. Its extensive welfare schemes and medical, social and educational services are all designed to give the railwayman and his family an enviable measure of social security, and in a country where this is not the prerogative of the welfare state, secure conditions of employment serve to attract and hold the more responsible type of man. Indeed it is the underlying strength of the S.N.C.F. that instead of being obliged to recruit labour from unattractive sources, it is continually making reductions, and is therefore in a position to discriminate and retain only the best elements suited to its service.

British Transport Docks has placed a contract with A. Monk and Co., Limited, Padgate, Warrington, for the construction of a reinforced-concrete piled and decked quay and four steel-framed transit sheds, together with extensive rail and road works on the north side of King George Dock, Hull. The new quay, which will be in continuation of the existing No. 1 Quay, will be 2,430 ft. long and each of the transit sheds will measure approximately 450 ft. by 150 ft. This contract is an important part of a £4½-million development scheme.



- Ten locomotives (with mechanical parts by North British Locomotive Company Limited)
- Seventy-one multiple unit stock equipments for three- and four-car units
- Twenty three inter-city multiple unit stock equipments for two- and four-car units

## The GEC contribution

to British Railways' 25 kV a.c. electrification scheme is an impressive one. Further G.E.C. contributions to the modernisation of British Railways include electrical equipment for: 127 Type 2 (1100 and 1250 h.p.) diesel-electric locomotives; 146-350 h.p. diesel-electric shunters; the 5 de luxe diesel-electric Pullman trains (10-1000 h.p. sets), and 10 Type 1 (800 h.p.) diesel-electric locomotives. In addition, 2800 traction motors have been or are being supplied to London Transport for the Piccadilly, Central and Metropolitan Lines.

British Railways and London Transport

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THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND  
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## ROADRAILER ON PUBLIC VIEW

### Revolutionary Carrier by Pressed Steel (Cont.)\*

A STEEL helical compression spring attached to each road arm holds each pair of road wheels against the van floor of the Pressed Steel Roadrailer. To keep the centre sill as low as possible, 10.00 by 15 by 16 tyres on 10.00 by 15 wheels are used. This tyre is freely available from tyre stockists. Each road wheel is equipped with an individual brake drum to provide adequate braking for the size of wheel and this standard automotive equipment.

#### Rail Brakes

The brakes fitted for rail application are of the disc type, in which braking surfaces are incorporated in the web of the wheels. Each wheel has an independent caliper system operated by its own vacuum cylinder. A hand brake operates on one wheel of each vehicle. There is a wide variation between the tare and gross weights of the vehicle, and therefore three-stage braking is provided. The first stage, tare application, is achieved by using one caliper with an 8 in. effective diameter vacuum cylinder. Deceleration is at the rate of 2.04 miles per hour per second. The second stage, part-loaded application, is achieved by using the other caliper operated by a 10 in. effective vacuum cylinder with the same rate of deceleration as for the first stage. The third stage, fully loaded application, is achieved by using both cylinders simultaneously at 1.58 m.p.h. per second.

A manual selector is used for the stages. There is a further position on the manual selector which enables the brakes on the last vehicle on the train

is its only rigid attachment to the van. The front headstock and cross members are free to float around the sill tube in nylon bushes. Under maximum conditions of loading the tubular sill may move as much as 0.8 in., but as the body is free-floating the deflection is not transferred to it.

#### Coupling Gear

The coupling gear is of the plug and socket type, capable of supporting vertical as well as draft loadings. The plug assembly at the leading end is screwed into the centre sill tube and welded. The plug is fitted with an internal ball joint giving an angular movement of 12 deg. The coupling socket is a steel casting welded into the rear headstock. Four retractable pins engage and automatically lock the plug in the socket. The locking pins are disengaged manually by means of a hand lever. The coupler and centre sill have been designed to withstand 400,000 lb. buffing and 250,000 lb. draft loading without exceeding the yield strength of the materials.

Although the coupling gear and centre sill have been designed to give a very large factor of safety, any failure could be serious, as the vehicles are supported at one end only. A safety device has therefore been incorporated. Attached to the underframe channel extensions which ride on the sill tube is a horizontal U-link with hook ends. When coupled, these hooks ride in two recesses in the rear headstock of the leading vehicle. In the event of a main coupling failure these hooks engage the leading headstock, support the trailing



A Bristol tractor unit of B.R.S. manoeuvring the Roadrailer into position over the railway track

to be isolated. This is thought advisable because of the lighter axle loading. Its effect upon the total braking performance of the train is negligible. Brake mechanism for each wheel consists of a compact lever system incorporating a fully enclosed automatic slack adjuster and brake reaction is transmitted through rubber bushed links to the vehicle structure. Other bushes are of sintered iron from wherever possible. The brake pads are non-metallic friction material on expandable steel backplates and can be replaced by the removal of two screws. A step machined in the friction material indicates permissible wear limit. The vacuum cylinders are of the diaphragm type and the piston rods are enclosed in convoluted neoprene covers, avoiding sliding vacuum seals.

#### Road Wheel Braking

The road wheel brakes fitted are two leading shoe cam-operated road haulage Girling heavy-duty expanding type, 12½ in. by 5 in. They are mounted in pairs, one at each end of an axle shaft. The brake is operated by compressed air from an air compressor on the road prime mover. Air is delivered from the compressor to a storage reservoir attached to the vehicle underframe and maintained between certain limits of pressure, thus providing air for a number of brake applications to be made consecutively. A relay emergency valve provides a means of applying the brakes instantaneously in the event of a van breaking away, in addition to quicker brake release.

A fully loaded Roadrailer coupled to a loaded Roadrailer in the rear will cause a static deflection of 3.9 in. in rail position. This represents an axle loading of 38,000 lb., which is the maximum designed axle loading. In the road position, the maximum trailer wheel loading is 22,000 lb. The static deflection of the road loaded position is 3.6 in. The rail and road arms are so proportioned as to provide approximately equal static deflection and actuator loadings in either rail or road positions. Although torsional set is often experienced with Torsilastic springs after protracted service, it should not occur in the Roadrailer because the spring is loaded in both directions. The resultant stress reversal in the rubber should eliminate any torsional set.

#### Landing Gear

In the running position, either on road or rail, the front end of the Roadrailer is supported by the vehicle ahead. When the Roadrailer is uncoupled it is necessary to support the front end; landing gear is provided for this purpose. The landing gear has two speeds. Two jacks are provided, one on each side of the vehicle, each of 16-ton capacity; they are inter-connected for manual operation. They are standard road haulage fittings. To these jack legs have been added a hinged road extension, permitting a 14 in. road-rail changing height without operating the hand crank. Each jack nut is totally immersed in oil and the landing gear as a whole is designed to carry a static load of 34,000 lb., with a safety factor of three to one. Power operation of the landing gear could be provided if it were thought desirable.

The centre sill of the vehicle consists of a single piece seamless tube 5½ in. outside diameter, with a wall thickness of 0.361 in.; it has a minimum yield strength of 80,000 lb. It is internally upset at each end taper threaded to B.S.21,1957. The centre sill is threaded into the rear coupler, which

vehicle in which the failure has occurred and automatically apply the train brake.

#### Underframe and Bodywork

The floor and underframe of the prototype Roadrailers are designed to suit all body types other than tippers and tankers. The bodies of flats and vans are supported on the centre sill through Cor-Ten high-tensile steel cross-members, located at about 18 in. centres. The prototype body is manufactured of aluminium and provides for end-loading. It is of semi-monocoque construction, using the sides as deep girders. A variety of bodies will be produced to suit the needs of traders. The dimensions of the prototype body are: length 24 ft. 7½ in.; width 8 ft.; height 8 ft. 2 in.; and cubic capacity 1,400 cu. ft.

The semi-trailer principle necessitates supporting the leading end of the front vehicle of each train when on rail. An adaptor truck is therefore provided behind the locomotive or behind conventional wagons. The truck consists of two parts, a bogie and a superstructure. The bogie is of conventional design. The superstructure carries the special Roadrailer coupling socket positioned over the geometric centre of the wheelbase. At the head of this socket is standard railway buffing and drawgear attached to a channelled frame. In rear is a balance weight. The superstructure is pivoted at the bogie centre and is free to rotate through 360 deg., thus eliminating the necessity for turning the vehicle.

#### Air Supply

An air supply is needed to operate the transfer mechanism. This can be an individual portable compressor or can be fitted to a prime mover. For prototype testing purposes a two-cylinder air-cooled diesel engine and a two-stage air compressor have been mounted on a Brush electric truck. Running experience here has been satisfactory although not extensive; each of the seven Chesapeake and Ohio units has run about 100,000 miles. These advantages are claimed:

Economy: the advantage of mass haulage over long distances by rail makes the Roadrailer more economical—the longer the distance the greater the advantage.

Speed: direct long-distance rail haulage is faster than the equivalent road haulage, but time is lost on rails by shunting and in marshalling yards. The Roadrailer, however, is designed for speeds of 70 m.p.h. (85 m.p.h. has been satisfactorily achieved on trials) and avoids shunting or marshalling yards.

Service: the Roadrailer has all the advantages of the conventional road semi-trailer, plus the greater track speed of through long-distance rail haulage. The carrier is therefore able to offer overnight delivery over extreme distances.

The capacity of 11 tons offers a striking advance on what can be done by container. There are obviously many traffic flows throughout the world where its characteristics can be used to great purpose. In this country British Railways and British Road Services are carrying out surveys of suitable flows and a start may be made in 1961. Ancillary users will be encouraged to buy them for similar flows where facilities can be provided and road haulage firms will not be discouraged from owning or using them, we understand, provided they are agreeable to following the railway maintenance procedure, which should not prove very onerous. As a medium of cheaper and faster transport the Roadrailer would appear to have a rosy future.



'Invincible' for Wynn's



'Warrior' for Tate & Lyle



'Wulfrunian' for West Riding



'Warrior' for Miers Transport Ltd.



'Invincible' for Regent Oil

# A good show of GUY's

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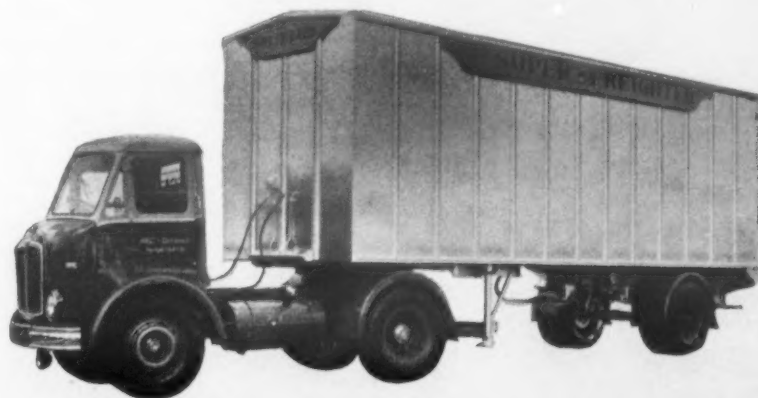


'Victory' for Lagos Municipality



GUY MOTORS LIMITED WOLVERHAMPTON

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How's this for weight-saving? A typical Duramin SUPER-FREIGHTER, 25 feet long with 10/12 ton capacity, has a tare weight of only 2 tons 13 cwt. Compared with other semi-trailers, it will save the operator at least 1 ton-mile in every 4 miles of distance covered. Freight is protected against the weather at all times. Safe against pilfering, too! And the new covered wagon saves time getting under way as well, because the driver just locks the doors and drives off. Please write for full details of Duramin SUPER-FREIGHTER designs from 22' 0" to 28' 0", with capacities ranging from 10/12 tons, to 14/15 tons and 16/17 tons for standard or specialised duties.



The Super-Freighter was extensively tested at MIRA and it is here pictured loaded with 12 tons of timber travelling on the pavé. A demonstration model is touring the country. Please book early to help us make arrangements.

light-alloy bodies by

**Duramin**  
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Tel: Viking 3322 (5 lines). Grams: Duramin, Ruislip  
also at Lydney, Gloucestershire. Tel: Lydney 208

\* Previous portion appeared September 24.



## RAILWAY ENTHUSIASTS

## Visit to Czechoslovakia

WITH commendable enterprise, the Stephenson Locomotive Society arranged this year a visit to Czechoslovakia. It appears to be the first time that a party of British railway enthusiasts has visited an Iron Curtain country at the invitation of the railway administration concerned. After a few days spent in Germany, the

party crossed the frontier to Cheb, and continued to Pilsen the same day. Waiting to greet the members was Mr. A. Loutocky, from the Ministry of Transport and Communications; he accompanied them all the time they were in the country. Cars were provided to take the group to the hotel, and the evening was left free to visit the town.



The main hall of the National Technical Museum in Prague

On the following day the guide met the party laden with SKODA railway catalogues, one for each member of the group. An interesting visit to Vrsovice locomotive depot concluded with refreshments in the conference room of the office block. Next on the list was a visit to the National Technical Museum, where a number of old locomotives are displayed, together with Russian jet aircraft! After this, the rest of the day was free to visit the city of Prague.

Leaving the city on the following day the enthusiasts travelled via Tabor and the narrow-gauge line from Obratan to Jindrichuv Hradec to Ceske Budejovice for the night. The narrow-gauge section was found to be completely dieselised, though two steam locomotives remain in store. Leaving Ceske Budejovice on the Saturday for Linz and the night train home, members bade

farewell to their faithful guide, by now somewhat tired after so much travelling. Indeed, he had been very patient in the face of many difficulties, and had spent a considerable time extracting members from the grip of local station officials, all incensed by the (normally strictly forbidden) practice of photographing locomotives!

The few days spent in the country gave a brief but thorough insight into life in a Communist state. The interest of the railwaymen in life beyond their

frontiers was very marked, and all were very well disposed to the British party as visitors, and anxious that they should have a good impression of Czechoslovakia.



A modern 4-8-2 of the Czechoslovak State Railways at the Vrsovice locomotive depot, Prague

## Abandonment of Tramways

## COMPLETE SYSTEMS REPLACED BY BUS AND TROLLEYBUS

WIDESPREAD interest has been aroused in the centenary year of the British street tramway by publication in MODERN TRANSPORT of August 6 of a table of dates of abandonment of the tramway systems of this country. This table, however, dealt only with systems substituted by buses or trolleybuses since 1938; in response to many requests we therefore now reprint a list showing abandonments down to 1937. A number of horse tramway systems, including Cambridge, Oxford, and Stirling and Bridge of Allan, faded away without electrification, although the Stirling concern certainly made an attempt in 1915

at conversion to petrol traction, already successfully accomplished at Heysham with Leyland units. The first complete electric system to close down was the small one at Sheerness-on-Sea, Kent. We include in the list now published the dates for the respective components of the London system.

Operation was not necessarily taken over by the owner of the tramways. Thus Ayr Corporation trams were replaced by buses of the S.M.T. group; Carlisle transport was divided between Cumberland Motor Services, Ribbles Motor Services, United Automobile Services, Caledonian Omnibus Company and the S.M.T.; Dudley and Stourbridge Tramways were replaced by Birmingham and Midland motor buses; and so on.

Date	Undertaking	Replaced by
February 18, 1914	Cambridge Street Tramways Company.	Competing motor buses (Ortona).
Early 1914	City of Oxford Electric Tramways, Limited.	Horse trams by motor buses.
July 7, 1917	Sheerness and District Electric Power and Traction Co., Limited.	Sheppey Motor Transport buses.
July 30, 1920	Neath Corporation. Gas-engined trams on Briton Ferry—Skewen route, five miles. Trams came from Blackpool, St. Annes and Lytham system in 1897.	Competing motor buses. Depot let as garage and later, until 1934, to South Wales Transport Co., Limited, as a bus garage.
1920	Stirling and Bridge of Allan Tramways Co., Limited.	Scottish General buses.
1921	Folkestone, Sandgate and Hythe Tramway Company (South Eastern Railway).	Competing motor buses.
May 28, 1921	Taunton Electric Traction Co., Limited.	National buses—the National Omnibus and Transport Co., Limited, later occupied the depot.
December 31, 1921	Lancaster and District Tramways Company.	Motor buses of Lancaster Tramways and Faby's, Ltd.
October 24, 1924	Morecambe Tramways Company (Petrol trams working in Heysham; purchased by Heysham Corporation to scrap).	Heysham and District Motors, Ltd., motor buses.
December 14, 1924	Keighley Corporation (on October 1, 1932, the trolleybuses were substituted by Keighley-West Yorkshire Road Car buses).	Trolleybuses.
December 16, 1924	Kilmarnock Corporation.	Motor buses.
July 15, 1925	Sunderland District Electric Tramways Co., Limited.	Motor buses.
July 31, 1925	Wantage Tramway (passenger service).	G.W.R. motor buses.
December 31, 1925	Waterloo with Seaforth U.D.C. Waterloo and Crosby Tramways (Worked by Liverpool Overhead Railway).	Motor buses.
April 10, 1926	Darlington Corporation.	Trolleybuses.
May 19, 1926	Wolverton and Stony Stratford (Steam).	Competing motor buses.
July 26, 1926	Ipswich Corporation.	Trolleybuses.
October 4, 1926	Morecambe and Heysham Corporation.	Motor buses for horse trams.
February 19, 1927	Burton and Ashby Light Railway, L.M.S.R.	Competing motor buses.
March 25, 1927	Hartlepool Corporation. West Hartlepool Corporation.	Trolleybuses.
March 31, 1927	Wrexham and District Transport Company.	Motor buses.
May 23, 1927	Chesterfield Corporation.	Trolleybuses (now due to be replaced by motor buses).
June 30, 1927	Rowley Regis U.D.C.	Motor buses.
June 9, 1927	Aberdeen Suburban Tramways Company.	Motor buses.
September 29, 1927	Cambridge and Redruth Tramway (Cornwall Electric Power Company, an Urban Electric Supply associate).	Competing Cornwall Motor Transport (now Western National) buses run over route.
September 30, 1927	Blessington and Poulaphuca Tramways (steam).	Competing motor buses.
September 30, 1927	Matlock U.D.C. (cable).	Competing motor buses; by arrangement with U.D.C. one supplied by E. Williams and Co., Limited, one by Alfreton Motor Transport Co., Limited, and two by North Western Road Car Co., Limited.
December 24, 1927	Glossop Tramways (Urban Electric Supply Co., Limited).	North Western Road Car motor buses serve area.
1927	Dumbarton Burgh and County Tramways Co., Limited. (Last return, July 31, 1927.)	Dumbarton General Omnibus Co., Limited, motor buses.
January 1, 1928	Wisbech and Upwell (L.N.E.R.-owned steam-operated. Freight continued.)	Competing motor buses.
May 9, 1928	Lees U.D.C.	Motor buses.
May 31, 1928	Worcester Electric Supply and Traction Co., Limited.	Birmingham and Midland motor buses on behalf of Worcester Corporation.
July 11, 1928	Potteries Electric Traction Company.	Motor buses.
July 11, 1928	North Staffordshire Tramways Co., Limited.	Potteries motor buses.
August 26, 1928	Wolverhampton Corp.	Trolleybuses.

(To be continued)

## NOSE SUSPENSION

## FOR AXLE-HUNG TRACTION MOTORS

Solving the complex problem of nose-suspension, Metalastik designs provide as much vertical deflection as required and enough flexibility to accommodate without frictional wear or noise all relative horizontal pitching and rolling movement of the motor and bogie transom. In general they may be divided into two main classes: those in which lateral thrust is taken by the axle sleeve bearings or other means and types with chevron-shaped rubber springs which resist lateral thrust.

The suspension in Fig. 1 has little lateral stiffness and a 400 h.p. motor on this design can be moved easily from side to side within the end play of its sleeve and axle bearings.

Fig. 2 shows a Crompton Parkinson motor with chevron-type nose suspension which has high resistance to relative transverse movement (due to compression of the rubber) but little resistance to rolling and tipping of the motor. The lower arms of the chevrons also carry the static weight of the motor nose and they are longer than the upper arms for this reason.

The chevron-suspension in Fig. 3 is for an A.E.I. (B.T.H.) motor. The upper arms of the chevrons are longer than the lower arms in this design as the direction of the static load is reversed.

PATENTS

## SOME OTHER IMPORTANT APPLICATIONS

Locomotive, Carriage & Wagon Spring Gear

Resilient Mountings for Main and Auxiliary Machinery, Cabs, Radiators, Instruments, Pantographs, Shoe Gear and for Signal Equipment

Flexible Couplings for Power Transmission and

## METALASTIK

## RUBBER SUSPENSION

— the first rubber suspension (axlebox and bolster) fitted in production quantities

METALASTIK



## Electric Traction on Eastern Region

(Continued from page 11)

has now been completed to meet the new conditions, and a burrowing junction to the Clacton line has been provided. There is an overhead maintenance depot at this point.

### Overhead Line

The overhead line equipment is of simple catenary and also of stitched catenary construction as appropriate to the various tracks; main catenary being of 19/.083 cadmium copper—and the contact wire being 0.166 sq. in. in cadmium copper. The total equivalent copper section is 0.231 sq. in. Those lines however in the Fenchurch Street area which were part of the original 1,500-volt d.c. scheme are being retained with the present copper section of 0.75 sq. in. In the main, the equipment is weight tensioned except for short sections where fixed tension equipment is used.

Overlap spans are provided as dictated by constructional demands and at certain other places to enable the line to be suitably electrically sectioned and neutral sections are provided at feeder stations and at certain track sectioning cabins to ensure segregation of incoming feeds of different phase. The supporting structures have been fabricated, using various sections of steel, including broad flange beam, double channel, four-angle welded rod, and tubular. Diversity of design used has been occasioned by the necessity to accept such steel as could be ordered at the time of placing the contract. Return conductors and booster transformers are being provided.

### London Tilbury and Southend Line

It is hoped to complete the electrification of the London Tilbury and Southend Line during 1961, and an outline of the train service, with a mileage of approximately 75,000 per week, was given this week by Mr. J. W. Dedman, the line traffic manager. The off-peak pattern will provide four trains per hour in each direction between Fenchurch Street and Shoeburyness, with two trains per hour via Tilbury also running to and from Shoeburyness. This is double the present standard service. Included in the four direct Shoeburyness trains will be two fast trains in each direction serving Southend, calling alternately at Upminster and Benfleet and Barking. The principle of alternating calls at Barking and Upminster on the fast services will thus be continued, but a Benfleet stop will be included for one of the fasts. The stopping trains will cater for the other stations.

All the train services off peak will be on a regular interval basis. The fast trains will leave Fenchurch Street at 0 and 30; the stopping trains at 10 and 40, and the Tilburys at 5 and 35 minutes past the hour. This will also provide for freight movement. The up fasts leaving Shoeburyness at 20 and 50 will leave Southend Central at 30 and 0 (i.e. same as from Fenchurch Street); the slows at 0 and 30 from Shoeburyness will also leave Southend Central at 10 and 40, and the two up Tilbury trains will leave Shoeburyness 10 and 40 and Southend Central at 20 and 50. All these trains will call at all stations in the borough of Southend, giving a 10-12 min. service in each direction, which it is hoped will encourage travel between the seven stations within that borough.

### Average of 52 m.p.h.

The half-hourly fasts will do the journey between Leigh and London (32 miles) in 37 min. (with one call), and 39 min. (with two calls including

Benfleet), averaging 52 m.p.h. Calling at all stations in Southend, these trains will take 45 and 47 min. respectively between Southend Central and London, compared with a normal 60 min. with steam, and faster than ever before. Even the slows, with seven stops, will reach Leigh in 49 min. and Southend Central in 57 min. against 79 with steam.

The two fast trains per hour off peak will cover the journey between Thorpe Bay and Fenchurch Street in just over 50 min. against 70 on present standard timings. The fastest train in the day will be the 9 a.m. ex Thorpe Bay, which will cover Southend Central—London in 43 min. and Leigh—London in 35 min. In effect, this pattern is the equivalent of a 40-min. journey between London and Southend. Grays will also have two trains per hour doing the journey in a little over 30 min. Stations between Bromley and East Ham, and Upney and Upminster Bridge inclusive will be served by London Transport trains.

### Substantial Peak-Hour Improvement

The morning and evening peak services on Mondays to Fridays will be substantially increased. During the morning peak there will be 40 train arrivals at Fenchurch Street against 32 at present and in the evening 38 departures against 29 at present. With the variation in the intensity of the peak these services are built up to a maximum of 18 arrivals at Fenchurch Street between 8 a.m. and 9 a.m. compared with 12 at present, and 21 departures between 5 p.m. and 6 p.m. compared with 12 at present. With 12-car trains providing seats for nearly 1,100 passengers, including first-class accommodation on all trains, there will be more than a 50 per cent increase in seating capacity in trains leaving Fenchurch Street during the period from 4.45 p.m. to 6.45 p.m.

During the busiest evening peak hour, six trains from Fenchurch Street will run via Tilbury, two of them bypassing Tilbury Riverside Station; two will terminate at Laindon. Of the remaining 13, all of which will run into the Southend area, eight will be fasts with limited stops and the other five will serve a few more intermediate stations, but not take much longer. There will be a similar number of trains during the morning peak period which, however, is a little more spread out. During the peak hours the journey between London and Benfleet will be accomplished in as little as 35 min.; London—Leigh in 40 min.; London—Chalkwell in 42 min.; London—Grays in 29 min.; and London—Stanford-le-Hope in 42 min.

### Branch Services

On the Tilbury route during the peak service two of the six trains per hour will be semi-fasts, serving Rainham, Grays, Tilbury Town, East Tilbury and Stanford-le-Hope. On the Upminster—Grays branch there will be a twice-hourly service between Upminster and Ockendon, with alternate trains extended to Grays and during the peak period basically a 20-min. service will operate. Between Romford and Upminster three-car diesel units will continue to operate a half-hourly service.

On Saturdays, the peak service will consist of a 10-min. regular interval service from Southend stations to Fenchurch Street, supplemented by Tilbury line trains. Each train will serve all stations from the point of origin to Benfleet, with staggered stops therefrom. A similar frequency will run from Fenchurch Street from 12 noon to 1.40 p.m.

## Locomotives and Rolling Stock for Overseas

(Continued from page 19)

motives due partly to difficulty in obtaining, in the comparatively small quantities required, the types of steel traditionally used, or even suitable alternative steels. Whilst this has so far not reached serious proportions, the attention of the industry has been drawn to the problem, as it is a point which needs to be watched in view of the life still to be expected from some of the steam locomotives now in service.

### Service

It would not be right to leave this brief survey of a complex subject without reference to the service engineer who often accompanies a new locomotive to see it safely into operation and to instruct local staff in correct handling and maintenance. A man of the right background and temperament for this work is not always easy to find but when found he is a great asset to the administration and a fine ambassador for his firm.

His is not a particularly easy job especially as such service overseas usually involves parting a man from his family for a long period and this aspect alone brings its own anxieties and its own problems. It is all the more important, therefore, that those responsible for making the arrangements for such contracts shall ensure not only that the terms of service, the conditions and the privileges, are clearly defined but that both the man himself and the railway administration concerned are fully

informed. The Crown Agents have had occasion to arrange many contracts for service and erecting engineers engaged on various kinds of work overseas and out of the troubles reported from time to time they have evolved a model form of service contract designed to avoid misunderstandings and thus to remove one of the main causes of argument and ill-feeling.

### New Ideas

This is but one aspect of human relations, a subject which, I think it fair to say, is now recognised as being almost as important as technical expertise, and this applies whether the sphere of operation be commercial or professional. In fact it is becoming almost more important in professional matters, for the giving of advice is a delicate thing, especially in rapidly growing countries where the flow of technical information is by no means a one-way traffic.

These growing countries are keenly alive to new ideas. The development of natural sources of electric power has already led some of them, despite the disadvantages of transmission distances and the comparatively sparse traffic, to consider the economic possibilities of electric traction. It is certain that as new types of motive power are developed, as equipment is evolved and as new materials become available, their railway administrations will be anxious to try them.

## RUBBER-TYRED ROAD ROLLER

By Aveling-Barford

INTRODUCED by Aveling-Barford, Limited, a pneumatic-tyred road roller powered by a direct-injection Perkins diesel engine is claimed to be the first of its kind to be produced in Britain. The roller has been developed for use in the construction of flexible pavements. It is fitted with a Four 270 diesel engine giving 57 b.h.p. at 2,000 r.p.m. and can be loaded with loose ballast to more than twice its empty weight, enabling pressures to be adjusted to suit different types of materials and conditions.

Features of the new roller are a kneading action permitting accurate control over the density and uniformity of asphalt-type surfaces and rear tyres are designed to span the gaps between the front tyres to achieve complete coverage of the surface. It is probable that the present growth in the number of flexible pavements and the simultaneous search for mechanical methods of finishing them will lead to great interest in the new machine.

## PUBLICATIONS RECEIVED

SITES FOR WORKS: Cardiff and Barry Docks. Brief details of six large sites available at these South Wales ports, together with an outline of port facilities available to tenants. The Chief Docks Manager, South Wales Docks, Pierhead Building, Cardiff Docks.

LEAD FOR BATTERIES. Extensively rewritten and brought up to date, this brochure in the Lead Development Association's *Applications of Lead* series will be welcomed by those not requiring information of a high technical nature. This publication and the others in the series are of particular value to students seeking to acquire basic knowledge of those applications in which lead plays a part. Copies of *Lead for Batteries* are available from Lead Development Association, 18 Adam Street, London, W.C.2.

IMPALCO ALUMINIUM. A new brochure by Imperial Aluminium Co., Limited, giving comprehensive technical data on Impalco products. Four sections deal respectively with aluminium; non-heat-treatable aluminium alloys; heat-treatable aluminium alloys; and other special-purpose aluminium alloys. Tables showing weight, composition limits, typical mechanical properties and comparisons with other metals are included.

A LIST OF GREDAK GREASES AND SPECIAL COMPOUNDS. A booklet containing an up-to-date list of Gredak greases and compounds, published by Acheson Colloids, Limited, P.O. Box 12, Prince Rock, Plymouth. Included in the standard range described are a number of greases incorporating molybdenum disulphide, introduced in recent years to augment the established group of graphited greases. The tabulated information includes the characteristics and advantages of each grade, its consistency and, where applicable, solids content and melting point.



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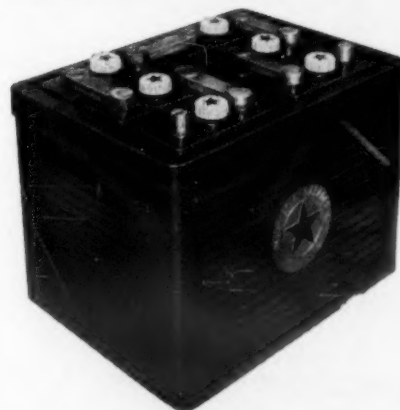
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Write Director of Recruitment, Colonial Office, London, S.W.1, giving full names, age, qualifications and experience, quoting BCD 173/66/D16.

Equipment and Accessories at  
Earls Court

(Continued from page 20)

by the Pyrene Co., Limited (stand 359). Among them are the PDS Mark II, PD10 and MPC charged with dry chemical and the 1½-gal. capacity MPF mechanical foam extinguisher. Metal finishing processes such as Bonderizing are exemplified. Additions to the Romac range (stand 172) are two electrically driven universal tyre repair moulds and nylon vulcanising plasters developed primarily for use therewith. There have been two compressors—the RT/D2 and the RT/D3—added to the range of air compressors and another debutant at Earls Court is a sand-blast cabinet. The chassis frame for the Guy Wulfrunian is built by Rubery Owen and Co., Limited, and is illustrated in a blown-up line drawing on stand 204 as well as tandem axles, trailer axles and other products. Also on this stand is a cutaway model of the 142 supercharger of Shorrock Superchargers, Limited, a member of the Owen Group.

## Limited Slip Differential

Four axle assemblies for vehicles up to 2 tons are displayed by Salisbury Transmissions, Limited (stand 366). This member of the Birfield Group is widely experienced in this work and it has now added to its range of products the Powr Lok differential under licence from the Thornton Axle Company. The growing demands for differentials with limited slip characteristics make this exhibit of particular interest this year. Most of the exhibits by Self-Changing Gears, Limited (stand 402), are well-tryed and widely used units and some are shown in exploded form. There is, however, the new RV51 heavy-duty transmission designed for use with the Self-Changing Gears torque converter. The new transmission was described in our issue of March 19. From a range of products displayed on stand 362 by Servais Silencers, Limited, particular attention is called to the straight through silencer embodying the manufacturer's patented packing. This is designed to give free passage to the exhaust gases while retaining an acceptable noise level. Two new water separator fuel filters are exhibited by Simmonds Aerocessories, Limited, on stand 302. One for diesel engines was introduced towards the end of last year and now appears in three forms. One has a single separator cartridge and the others each have two. The other filter is for petrol engines.

Important items to which Simms Motor Units,

Limited, is calling attention on stand 225 include the Minimec fuel pump, a development of the Minipump, which is the smallest in-line pump of its kind in the world and has a built-in mechanical governor. A new impregnated paper fuel oil filter has no springs or seals to remove when changing the element and on the electrical side there is a new 4½-in. diameter axial-engagement starter motor particularly to suit the smaller mass-produced diesel engines. Apart from the new a.c. generator itself there is accompanying it a complete transistorised system of control so that there are no moving parts in the form of vibrating contacts of any kind. Other new equipment comprises a 4½-in. high-output d.c. dynamo and a 7 cu. ft. air compressor to meet the growing demand of servo-assisted braking on commercial vehicles. The range of Don brake and clutch linings, together with the belts, bonnet tapes and other products, is on the stand of Small and Parkes, Limited (245). Three separate stands exhibit the products of Smiths Motor Accessory Division. On 240 there are the K.L.G. sparking plugs and on 230 are electrical instrument panels, instruments, batteries, hose, pipelines and cooling-system compounds. Most of the new items are on 312 which displays products of the Whitney sub-division. The new Spherivent air outlet control is positively self-sealing when closed and has complete air direction through 360 deg. around its periphery and 180 deg. to the plane of the vent face. Also in the heating and ventilating field there are the canopy heater for double-deck buses, the thermostatically operated metering water valve kit, thermostatically and torque-controlled viscous fan couplings and the F370 commercial vehicle cab heater. Stedall and Co., Limited (stand 393), shows numerous items of equipment for vehicles and garages and also on this occasion the Mickleover reinforced plastics shutters for commercial vehicles.

## Scale Chassis Models

Representative examples of SuPerfect oil seals and retainers and Aerquip and Hyline flexible hose assemblies are on the stand of Super Oil Seals and Gaskets, Limited (338), where attention is called particularly to the silicone rubber element oil seals which have been successfully applied to commercial vehicle disc brakes. Instead of showing full-size chassis frames and small fabrications, John Thompson Motor Pressings, Limited (stand 346), exhibits four scale-model chassis in conjunction with enlarged photographs showing the application of the chassis frame to current commercial road vehicles. Basically the range of Tip Top Vulcanising Products (stands 148 and 410) materials and equipment continues as before, but opportunities have been taken to modify a number of the processes for added versatility and easier registration. A new air-pressure motor, the APML, which can operate through linkage two pantograph arms and blades, figures on the stand of Trico-Folberth, Limited (281), as well as the other equipment with which the name is associated.

Although not now a vehicle builder, the Turner Manufacturing Co., Limited (stand 278), makes many components for the industry and has for more than 30 years made winches for military vehicles. Commercial applications include the 2,500-lb. winch for fitting to the Austin Gipsy or Land-Rover. This is its first appearance at the show. With an eye upon the higher operating speeds on motorways the Tyresoles exhibit on stand 181 this year stresses the importance of cool running and the advantages of the Wyresoles steel-claw tread in that regard. The latest design introduced by Weathershields, Limited (stand 202), is the Qwikvent, a three-way lift hinged roof ventilator which gives increased stability when the roof is open and also has the advantage of an intermediate position. The enhanced stability makes it possible to disperse with external stabilisers. The Westinghouse Automotive Products division of the Westinghouse Brake and Signal Co., Limited (stand 387), has working exhibits of two layouts suitable for providing air assistance to a hydraulic-brake system and another working exhibit of a Deans door shows the new pneumatic-door equipment. Young Accumulator Company (stand 386) has both open plate and armoured types of Crompton heavy-duty batteries, all of which now embody the F.S.C. (factory-sealed charge) feature.

## REVIEW OF THE SHOW

(Continued from page 12)

Vendor introduces front-wheel drive and all-independent suspension to lower loading and greater freedom of body design in the 30-cwt. to 2-ton capacity class of delivery vehicle.

## Passenger Chassis

New passenger chassis include both the traditional, in the form of the A.E.C. Regal Mark VI heavy-duty single-decker, developed along the well-proved lines of the successful Reliance, to the new, as illustrated by the air-sprung disc-braked Guy Wulfrunian, the rear-engined Daimler Fleetline and the Leyland Lion export chassis, also with engine at the rear. Perhaps the most important of passenger vehicle developments is that which provides freedom for the bodybuilder to provide entrance and platform where the operator wants it—a feature provided by the Dennis Loline, A.E.C. Bridgemaster and Guy Wulfrunian.

The use of the air-cooled diesel engine in the Magirus-Deutz single-deck stage-service bus is creating a good deal of attention from bus operators interested in the potential maintenance economies of air cooling. This has led the exhibitor to invite interested parties to sample the running of the vehicle in demonstration trips after the show, one to the headquarters of the Gosport and Fareham Omnibus Company, which has had a Deutz-engined double-decker in service for some time and has placed orders for engines to make further conversions, and one to the M.I.R.A. proving ground near Nuneaton, under the sponsorship of Bristol Commercial Vehicles, Limited.

Summing up an exhibition of such wide and diverse coverage is difficult in a few words; there is sufficient major innovation to warrant the closest study by vehicle engineers, but probably far more important to the immediate road transport scene is the wealth of minor advancements to be seen in every department most of which achieve their object of improving operating efficiency.

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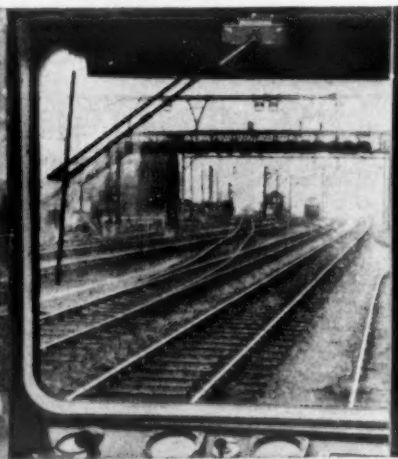
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## SOCIAL AND PERSONAL

### Locomotive Engineers Functions

A PAPER, "Operating Experience of the Diesel-Electric Train Sets on the Hastings Service," is to be read by Mr. W. J. A. Sykes (chief mechanical and electrical engineer, Southern Region, B.R.) at a meeting of the Institution of Locomotive Engineers at 1 Birdcage Walk, S.W.1, on October 18. On October 25-27 a party of members of the Institution will be the guests of Vickers-Armstrongs (Engineers), Limited, and Sulzer Brothers (London), Limited, when the Barrow shipyards and engineering works of the former company will be visited. The headquarters will be made at Bowness-on-Windermere.

The annual staff dance of Leeds City Transport is being held at the Capitol Ballroom, Meanwood, Leeds, on March 17, 1961. This event is now a fixture in the social diary of people in the transport world.

As announced in our last issue, Mr. J. D. C. Churchill, F.S.S., has been appointed planning officer in the commercial department of London Transport Executive.



Mr. J. D. C. Churchill

Educated at Cheltenham College, he joined the Underground group of companies in 1929 and served in several departments before being appointed to the office of the vice-chairman in 1939. During the war he served in Europe and the Mediterranean, becoming a brigade major in 1944. On demobilisation, Mr. Churchill was appointed to the chairman's office, serving as secretary to the chairman from 1947. In 1948, he became responsible for the work of the development and research office and in 1952 was appointed planning officer in that office; he became assistant secretary of the undertaking in 1955. In his new post he is responsible to the chief commercial and public relations officer.

We regret to record the death, at the age of 79, of Sir Arthur Fleming, one-time director and manager of the research and education department of Metropolitan-Vickers Electrical Co., Limited. In his continuous interest in research he was instrumental in the evolution of radar.

In recognition of its 13 years of helicopter operations, B.E.A. has been chosen to receive the American Lawrence D. Bell Helicopter Pioneer Award. It was presented on September 20 to Lord Douglas of Kirtleside, chairman of B.E.A., by General John Schweizer, European representative of the Bell Aircraft Corporation. The award, which



The American Bell helicopter award is handed by General J. Schweizer to Lord Douglas of Kirtleside, chairman of B.E.A. (see accompanying paragraph). Extreme left is Mr. A. H. Milward, B.E.A. chief executive, and extreme right, Captain J. A. Cameron, its chief helicopter pilot

is named after the founder of the Bell Corporation, is made to commercial helicopter operators who have been in business at least 10 years. B.E.A. formed its helicopter experimental unit in 1947, barely a year after the world's first commercial helicopter certificate was earned by Bell. It still has a Bell 47B two-seater, believed to be the oldest helicopter now flying.

Mr. D. H. Le Conte has been appointed secretary of the Northern area of the Road Haulage Association to succeed the late Mr. Frank Milton.

We record with regret the death of Mr. W. H. Park, a former director of Harland and Wolff, Limited. He was 74.

Mr. Davidson Pratt, C.B.E., retired from the post of chairman of the British Road Tar Association on September 30.

Mr. P. Blandford, M.A., B.Eng., A.F.R.Ae.S., A.M.I.Mech.E., has been appointed manager, technical sales, Ferodo, Limited. He will handle liaison with the technical and design staffs of major customers at home and abroad with regard to technical matters. The department is also responsible for advising the Ferodo research division on present and future technical requirements of friction materials for the automobile and engineering industries. Mr. Blandford was educated at Malvern College and Trinity Hall, Cambridge, where he obtained his mechanical sciences tripos in 1937. During the war he was a pilot in R.A.F. Bomber Command and later an engineer officer in the Technical Branch of the R.A.F. In 1943 he was seconded to the Directorate of Technical Development, Ministry of Aircraft Production, and in 1945 was transferred to the Ministry of Supply. In 1946 he joined Vickers Armstrongs (Aircraft), Limited, at Weybridge and for five years was a member of the aircraft design office. Later he set up the organisation for servicing Viscount aircraft in the field on a worldwide basis.

Mr. P. G. James has been appointed a director of the Birmingham and Midland Motor Omnibus Co., Limited, vice Mr. F. R. Stockhill, who has resigned his seat.

Goldsmiths' College, New Cross, announces a series of 26 lecture-discussions on "Railways in Britain, 1802-1960" on Tuesdays from 7 to 9 p.m., commencing October 4. The tutor is Mr. R. H. G. Thomas and the fee for the course 21s.

The Minister of Transport has appointed Mr. D. S. Hart to be a member of the Transport Users Consultative Committee for the South-Western Area until July 31, 1962, in place of the late Mr. L. Edwards. Mr. D. S. Hart is divisional traffic manager, Bristol, Western Region, B.R.

Mr. E. D. Trask, M.I.Mech.E., M.I.Loco.E., assistant to general manager (special duties), Eastern Region, B.R., retired on September 30 after 49 years railway service. He began his railway career at Doncaster works in 1911. Latterly he has been very closely concerned with the maintenance and working of all forms of diesel traction in the Eastern Region.

Visits have been arranged by the Institution of Railway Signal Engineers to signalling installations on the Putney section, the Earls Court area, and Upminster, on the London Transport District Line. A special train will be provided to Upminster on this occasion, the date of which is October 15. The new programme machines at Putney Bridge and Parsons Green will control depot working as well as normal running.

Illustrated on this page is the presentation of the Bonallack challenge trophy to the winners at the annual golf tournament held earlier this month. This is a unique event in the transport world because of the golfing prowess of the Bonallack family. Mrs. Angela Bonallack is a Curtis Cup player, and like Miss Sally Bonallack is also an English ladies international. Mr. Michael Bonallack, who is, of course, a Walker Cup player, has just left for the U.S.A. to compete for the World Cup shortly to be played for in Philadelphia. Mr. R. A. (Tony) Bonallack is an Essex county player.

The Institution of Railway Signal Engineers announces that at a meeting on October 20 at Savoy Place, W.C.2, a paper by Mr. W. Woodhouse (London Transport Executive), "Putney Line Programme Machines," will be presented. It describes the traffic workings on this Underground section to be catered for by programme machines and states the essential difference between the installation described and earlier installations in that a system had to be devised which would deal with a variable programme day by day without recourse to a multitude of machine rolls. The annual dinner and dance will be held at the Connaught Rooms on October 28.



Mrs. R. F. Bonallack presents the challenge trophy cup to Messrs. J. Glover and C. Bradbury after the annual Bonallack golf tournament at Thorndon Park, Essex. On the right is Mr. R. F. Bonallack

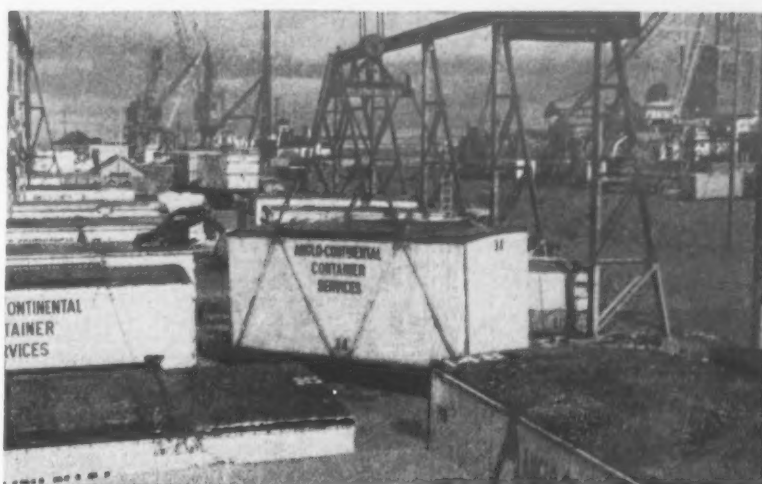
Mr. P. J. Daglish, B.Sc., M.I.Mech.E., M.I.E.E., A.F.R.Ae.S., has been appointed special executive responsible to the managing director of D. Napier and Son, Limited. Mr. Daglish joined English Electric in 1946 and prior to joining D. Napier was manager of the English Electric aircraft equipment division at Bradford. In this post he has been responsible for the establishment of the division which is now providing a wide range of equipment for aircraft being built in Europe and the U.S.A.

Mr. J. Kirkby Thomas, M.A., is relinquishing his post of principal of British Railways School of Transport at Derby after nine years in order to undertake special duties in the department of the manpower adviser at B.T.C. headquarters.

Mr. K. D. Rhodes, B.Sc.(Eng.), A.M.I.C.E., has been appointed general assistant (maintenance and organisation) in the chief civil engineer's department, Western Region, B.R. Mr. Rhodes joined the Great Western Railway in the chief engineer's office, Paddington, in 1936. He became assistant district engineer, Cardiff Valleys district, in 1951 and later assistant district engineer, Newport. He was made organisation and methods assistant, Paddington, in January, 1956, and district engineer, Cardiff, in April, 1959, which post he now vacates upon taking up his new appointment.

The annual dinner of the Omnibus Society was this year held in London to afford members an opportunity of combining attendance with a visit to the Commercial Motor Show. Sir William Black, president, was in the chair and replied to the toast, "The Omnibus Society," proposed by Mr. A. G. Jones, managing director, Guy Motors, Limited. "Our Guests" was proposed by Mr. Charles Klapper, a founder member and past president, and Mr. A. F. R. Carling, chairman of the Public Transport Association, responded. Mr. J. Graeme Bruce, chairman of the council of the Omnibus Society, announced that the president-elect for 1961 was Mr. W. M. Little, general manager of Edinburgh Corporation Transport Department. Mr. Little, Mr. A. B. Valentine, chairman of London Transport Executive, Mr. J. O. Bowley, general manager, A.E.C., and Mr. J. W. Shirley, Park Royal Vehicles, were among the guests. On the following day a large party of members, at Sir William Black's invitation, visited the A.E.C. and Park Royal Vehicles factories of the A.C.V. group.

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## IMPORTANT CONTRACTS

## Large Orders at the Show

THE British Motor Corporation announced at the Commercial Vehicle Show that it had secured a contract worth U.S. \$500,000 for the supply of diesel-engined bus chassis for the Saigon Municipal Bus Company. The contract was awarded by the Central Purchasing Authority of the Government of Vietnam as the result of an international tender, in which the main competition came from Japan, Germany, France and Italy. Under the contract the Austin Motor Co., Limited, will supply 153 Austin A702 160-in. wheelbase forward-control chassis with Halmo 50-in. wheelbase and 24-in. frame extension. One complete prototype bus on the same chassis will also be delivered fitted with the Marshall-Mulliner metal-framed 45-seat bus body built at Cambridge. Delivery is due to be completed by early 1961. Locally fabricated bodies are to be fitted to the chassis in the workshops of the Saigon company.

## Beclawat in "Windsor Castle"

Large numbers of vertically sliding jalousie sashes inside the windows in the public rooms and cabin accommodation of the *Windsor Castle* were equipped with Tensator constant-force balance mechanisms supplied by Beckett, Laycock and Watkinson, Limited, as well as safety catches and racks to secure the sashes against outside entrance.

## Show Order for Gearboxes

A few hours after the opening of the 1960 Commercial Motor Show at Earls Court on September 23, the David Brown Automobile Gearbox Division, of Park Works, Huddersfield, announced receipt of a single order valued at over £90,000. The bulk of the order covers supply of the new six-speed model 687 gearbox which is on show for the first time.

## Marconi Sixty Series for VC10

Marconi's Wireless Telegraph Co., Limited, is to supply the new Sixty Series airborne radio and navigation-aid equipment for the 35 VC10 jet aircraft on order for British Overseas Airways Corporation. Sixty Series equipment, which was first shown publicly at the recent S.B.A.C. Exhibition, embodies radical new design features, including extensive use of transistors, providing advantages of low weight and low power consumption.

## Guy Lorries Ordered

The first large order placed with Guy Motors at the opening of the Commercial Vehicle Show was from T. J. Richardson and Sons, Limited, of Oldbury, Birmingham, which has both dealing and operating interests. The order, which amounts to 40 vehicles, is made up of Guy Invincible eight-wheelers, Guy Warrior Light-Six and Guy Warrior Light-Eight vehicles and is worth approximately £150,000.

## Large A.E.C. Exports

During September the export division of A.E.C., Limited, obtained orders from three territories alone totalling £1,125,000. As recently announced,

A.E.C. (Australia) Pty., Limited, received orders totalling £483,000 in one week and since then another 20 chassis have been ordered, which brings the total for Australia to over £525,000. A.E.C. Vehicles (S.A.), Limited, the A.E.C. South African subsidiary formed only last year, continues to expand at a rapid rate. 128 chassis of all types, valued at £350,000, have been ordered during September and these include 12 Mammoth Major eight-wheelers for South African Railways and 24 Mammoth Major six-wheelers for work in the Usutu Forest for the Colonial Development Corporation. Middle East orders during one week totalled £250,000 and included 24 Ranger chassis complete with bodywork for Karbala Passenger Transport Services.

## Tehran Orders Street Cleansing Fleet

In the face of competition from German and other Continental manufacturers, Leyland Motors Group has gained a £400,000 contract from the Municipality of Tehran for re-equipping the city's street cleansing and refuse collection system. It comprises 45 Leyland Super Comet 14-ton vehicles, 37 Scammell Scarab 6-ton mechanical horses and 2,000 handcars complete with 4,000 dustbins. Forty of the Super Comets will have 18-26 cu. yd. Eagle Compressore refuse collection bodies and the remaining five vehicles will be supplied as street washers. Thirty of the three-wheeled Scarab mechanical horses will be equipped with Scammell 10-12 cu. yd. refuse collector semi-trailers which are side loaded and mechanically tipped. Five of the petrol-engined Scarabs will be fitted with Scammell street sweeper-collector semi-trailers and the remaining two will have 800-gal. gully emptying tanker semi-trailers.

## SHIPPING AND SHIPBUILDING

## Channel Islands Service Economies

DELIVERY by the spring of next year of both the new passenger ships, *Caesarea* and *Sarnia*, which the B.T.C. has ordered for its Channel Islands services will mean that these services can be reorganised and operated with only three vessels instead of five as at present. The old ships, *St. Helier* and *St. Julien*, built in 1925, are to be sold.

## Three More Lines Join O.T.D.

THREE more shipping lines have joined the ranks of Ocean Travel Development. The Norwegian America Line and Swedish American Line have become affiliated members and a new full member is Ben Line Steamers, Limited, operating to the Far East.

## Liberty Ships for Scrap

THE U.S. Maritime Commission plans to offer the largest group of obsolete vessels in the reserve fleet yet to be disposed of to the highest bidder for scrapping. Disposal of this group of 219 vessels will liquidate the entire segment of the Wilmington, North Carolina, reserve fleet and will cut the Government's holding of reserve ships to around 1,800 in seven locations.

## Emigrant Shipping Company

THE establishment of a new company to take over from the Netherlands Government the service of ships taking Dutch emigrants to British Commonwealth countries has been proposed in a Bill submitted to the lower house of the Parliament at The Hague. The company, to be called Trans-Ocean, would be run jointly by the Government and N.V. Scheepvaart Participatie Maatschappij

(Shipping Participation). The company has been formed jointly by the Nederland company and Koninklijke Lloyd. It would operate three Government emigrant ships, the *Groote Beer* of 9,190 tons gross, *Waterman* of 9,176 tons gross and the *Zuiderkruis* of 9,178 tons gross, on the basis of a hire purchase agreement with a 10-year term. The emigrant ships would take Dutch families to South Africa, Australia and Canada.

## Individual Air Conditioning

AN air-conditioning system by Thermotank providing individual temperature control in the cabins has been installed on the new Strick Line 12,850-ton cargo ship *Kohistan*, built by John Readhead and Sons, Limited, South Shields. There are three central air-conditioning units, each incorporating finned-tube heat exchangers. When cooling is required the heat exchangers are supplied with chilled water from a central refrigeration plant of the freon type. In winter conditions warm water is circulated to the same heat exchangers from a calorifier fitted in association with the refrigeration plant. Individual control is obtained by means of small finned-tube reheaters sited in the branch ducts across which the conditioned air from the central unit passes before entering the accommodation.

## Oslo Harbour Improvement Plans

SEVERAL schemes for expanding and modernising port facilities are being considered by the Port of Oslo Authority. They include the construction of a new administration building, the modernisation of certain old quays and the construction of some new ones, and the provision of new warehouses and other facilities. Two new passenger quays are scheduled to be completed early next year. Both are for new lines, one linking Oslo and Kiel, and one between Oslo and the Danish town of Aarhus. Moreover, both of the new lines will be served by combined vehicle and passenger ferries. This means that the new quays will need neither railway sidings nor cranes—cargo for the ferries can be packed in containers, loaded on vehicles, and driven directly on board. Another scheme aims at converting one of the port's old coal quays to a piece goods quay and warehouse.

## FINANCIAL RESULTS

NOTES on the trading results, dividends and financial provisions of companies associated with the transport industry are contained in this feature, together with details of share issues, acquisitions and company formations or reorganisations.

## Gloucester Railway Carriage and Wagon

The Gloucester Railway Carriage and Wagon Co., Limited, announces that total distribution for year ended May 31 is 1s. per 10s. share (1s. 6d.).

## De Havilland

It has been decided that the de Havilland Aircraft Co., Limited, and de Havilland Propellers, Limited, can be more efficiently run as a single entity. Arrangements are accordingly being made to combine their activities under a joint board in a single company to be called The de Havilland Aircraft Company; de Havilland Holdings will cease to function. The details of these arrangements will be announced in due course.

## B.T.C. TRAFFIC RECEIPTS: PERIOD NO. 9—1960

	Four weeks to			Aggregate for 36 weeks to		
	Sept. 11 1960	Sept. 6 1959	+ or -	Sept. 11 1960	Sept. 6 1959	+ or -
	(£ thousands)			(£ thousands)		
PASSENGERS						
British Railways .. .. .	13,546	13,235	+ 311	107,829	100,069	+ 7,760
London Transport .. .. .	4,452	4,313	+ 139	39,201	37,613	+ 1,588
Road passenger services .. ..	1,982	1,768	+ 214	17,651	16,266	+ 1,385
Railways .. .. .	5,576	5,716	- 140	43,504	42,852	+ 652
Provincial and Scottish Buses ..	1,261	1,409	- 148	5,937	5,958	- 21
Ships .. .. .						
Total Passengers	26,817	26,441	+ 376	214,122	202,758	+ 11,364
FREIGHT, PARCELS AND MAELS						
British Railways .. .. .	7,624	7,271	+ 353	69,345	67,174	+ 2,171
*Merchandise and livestock .. ..	3,699	3,155	+ 544	33,445	29,612	+ 3,833
*Minerals .. .. .	7,741	7,185	+ 556	72,434	74,726	- 2,292
*Coal and coke .. .. .	4,365	4,190	+ 175	38,266	36,789	+ 1,477
*Parcels, etc., by coaching train ..						
*Total Freight British Railways ..	23,429	21,801	+ 1,628	213,490	208,301	+ 5,189
Others .. .. .	4,670	4,366	+ 304	39,266	37,558	+ 1,708
Total Freight, Parcels and Mails	28,099	26,167	+ 1,932	252,756	245,859	+ 6,897
Aggregate	54,916	52,608	+ 2,308	466,878	448,617	+ 18,261

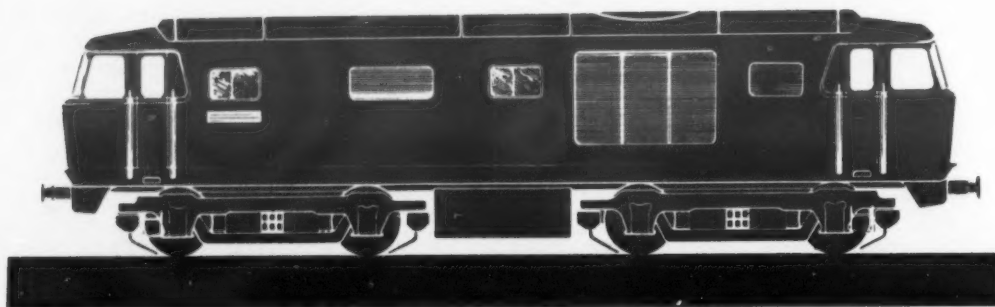
\*Includes receipts from collection and delivery, etc., and from railway freight traffic within Commission-owned dock areas. Comparisons are affected by changes which have been made from time to time in rates and charges.

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or

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